GAVĀM AYANA

THE VEDIC ERA

An Exposition of a forgotten Sacrificial Calendar of the Vedic Poets, including an Account of the Origin of the Yugas, chiefly on the basis of the Vedas and Contemporary History of Foreign Nations

by

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The Late SIR K. SHESHADRI IYER, K.C.S.I.,
(Dewan of Mysore, 1884-1901).

This Work

is

Inscribed to the Memory

of

SIR K. SHESHADRI IYER, K.C.S.I.,

the Author's beloved Patron and the

remarkable Statesman of Mysore,

in whom the East and the

West found a harmonious

combination.

PREFACE.

THE frequent references made in the Vedas to the year, the seasons and the revolving Yugas led me some years ago to think that the Vedic poets must have had something like an era of their own to count the years, and that the meaning which they attached to Krita and the names of the other Yugas can by no means be what those words bear in the later astronomical works of India. It appeared to me absurd to believe that the Vedic poet meant ten times 4,320,000 years when he said that Dirghatamas grew decrepit in **his tenth Yuga.** Also the mention made in the Rigveda itself of the names of such Indian kings, as Manu, Mandhatri, Ambarisha and others, who are some of the 153 kings of the Solar dynasty from Manu to Chandragupta, forced me to believe that the composition or, if the phrase be preferred, the gradual revelation of the Vedic and Brahmanic texts began with Manu and ended with Parikshit, the grand-son of Yudhishthira of the Lunar dynasty. This Parikshit who is the last among the kings mentioned in the Brahmanas is the sixth descendant from one, Devapi, who is described in the Kalkipurana as the contemporary of Maru, the ninetieth king in the almost complete list of the Solar kings, descended from Manu. Giving, therefore, an average duration of about 20 years to the reign of each of the 90 Solar kings, we arrive at about 1,800 to 1,900 years as the only historically probable interval, during which the revelation of the Vedas and the Brahmanas may have ccntinued. To my surprise and, perhaps, to the surprise of others, this is the result at which I have also arrived after a careful consideration of the Vedic era of Gavam Ayana, as set forth in the following pages. In this era the years are counted in terms of intercalary days occurring once in a Yuga, or cycle of four years ; and the era itself is personified as the age of a divine child, Agniprajapati.

Neglected and starved for about 3,200 years after attaining its 460th birthday, this emaciated child came under my notice by chance about three years ago, and has since then been under my constant care. But the amount of intellectual nourishment and dressing which it demanded from me was really out of proportion to my limited means; and I fear that, under my inadequate treatment, it may not have recovered its original appearance sufficiently to render its identification free from doubt. But I believe that if there be any difficulty in the identification, it is not because the era itself is spurious, but because I have not been able to ascertain all the necessary links of evidence and to present my arguments with the force of a perfect demonstration. I shall, however, consider myself amply rewarded, if my appeal on behalf of this famished and sickly child reaches the ear of abler doctors, and induces them to attempt a proper examination of the birth, growth and vicissitudes of this Era-child. I am inclined to think that, when this is done, the numerous evils, which Hindu society has been inflicting upon itself from misunderstanding its own past history, will vanish and that a new impetus will be given to its onward march in the path of civilization.

As, in the nature of the work, it is not possible to avoid numerous references, quotations within quotations and transliteration of Sanskrit words, it has been a difficult task to see it through the press; and I am not so sanguine as to hope that all errors have been eliminated. I wish, however, to say here that without the help of the Rev. E. W. Thompson, M.A., who has been kind enough to go through all the proofs and make a number of valuable suggestions, this little book would not be such as it is now. For this disinterested kindness on his part, I beg to acknowledge my deep obligations to him and also to Mr. T. Gould, the Manager of the Wesleyan Mission Press, for the quick despatch and the get-up of the work.

Mysore,
15th August, 1908.

R. SHAMASASTRY.

CONTENTS.

Gavam Ayana

The Vedic Era

R. Shamasastry, B.A.

INTRODUCTION.

OF all the world's extant literary records, the Vedas have been admitted to be the most ancient and the earliest expression of the thoughts of civilized society. No nation outside the limits of India has been found possessing such old records; nor is it likely that the archæological explorations made in different parts of the world will bring to light any such religious literature. As the earliest expression of human thought, the Vedas have been of inestimable service for the correct conception of the first principles of philology, mythology, and the origin and growth of religion.

Admitted as is the antiquity of the Veda, scholars are still puzzled about its age. The vedic commentators such as Jaimini, Sāyaṇa, Mahīdhara, and others regard the Vedas as coeval with the creation of the world. They hold that the Vedas form part of the Creator's person; that they are manifested or revealed at the dawn of every Creation, and withdrawn into the Creator's body along with the whole world at each destruction of the world; and that the sacrifices and other ritualistic observances enjoined in the Vedas are so many injunctions imposed upon class of the twice-born. But modern oriental scholars, whether Indian or European, regard this theory of revelation as no better than a nursery tale. These scholars are of opinion that, like any other literary work, the Vedas must be a product of civilization and that as civilization itself is of recent growth, the Vedas, as one of its products, must be still more recent. With this conviction, they have carried on their investigations into the historical records

of various nations and founded their conclusions about the chronology of the various kinds of the world's activity on available internal and external evidences. Prof. H. Jacobi,[1] for instance, has found in one of the Ṛigvedic hymns (X, 85, 13) a clear reference to the position of the solstitial colure in Uttara Phalguṇi (*b.* Leonis) and Uttara Bhādrapada (*a.* Andromedæ), the year beginning with the summer solstice in the rainy season (Ṛig. VII, 103, 9), and thereby determined the age of the Ṛigveda to lie somewhere between 4500 and 2500 B.C. He says:— "This period of civilization extended accordingly from about 4500 to 2500 B.C. and we shall, perhaps, not be far wrong if we put the collection of hymns which has come down to us in the second half of this period." Likewise Prof. B. G. Tilak[2] has found independently in the Vedas clear references to the shifting of the position of the equinoctial colure from Ardra (Beteigeuze) to Kṛittikas (*h.* Tauri) and fixed the Vedic age to be the same as that of Prof. H. Jacobi. But other scholars could not bring themselves to believe that the Hindus of such a remote age were so far advanced in their knowledge of astronomy as to make observations of the positions of the colures. Hence, setting aside the above internal evidence, they had recourse to all available external evidence to determine the age of the Vedas. Taking the beginning of the Buddhistic period (500 B.C.) as the land-mark of Indian chronology, Prof. Max Mūller, for instance, divided the previous Vedic period into five parts, the Ṛigvedic period, the Yajurvedic period, the Brāhmanic period, the Upanishad period and the Sūtra period; and allowing about two centuries for the growth of each of the literary periods, he fixed the commencement of the Ṛigveda at about 1500 B.C.

It is really surprising that, while making these and other surmises about the Vedic age, both the mediæval

[1] P. 154 Vol., XXIII *Indian Antiquary*.

[2] See *Orion* by Prof. B. G. Tilak.

commentators and modern critics, notwithstanding their well-established claim to possess a thorough grasp of the contents of the Vedas, should have utterly failed to notice what the vedic poets themselves professed as their aim. From the first verse of the Ṛigveda to the last line of the latest Brāhmaṇa, the sole aim of the poets has, as will be seen, been the preservation of a sacrificial era, represented as the age of the bird-like Agni Prajāpati or the sacrificial fire-god, that was kindled anew cycle after cycle or as the sacrificial session of a cow or cows. It is the era of bissextile years, the intercalary days of which have been separately counted as forming the age of the bird-like Agni, or as constituting a distinct sacrificial session of four-footed cows. It is in short an era of bissextile intercalary days, regularly counted as one day's years, two days' years, three days' years, thirty days' or a month's years, and so on—corresponding to as many Yugas or cycles of four years each. It is the same era as is meant when the ancient Egyptians, to the bewilderment of historians, spoke of one day[1], two days, a month, two months, three months, and so on as a year. It is the same era as is meant in the so-called astrological[2] year of 260 days of the Aztecs whose system of astronomy is found to be analogous to that of the Hindus. It is the same era as is meant in what appears to be an insoluble astronomical riddle, the year of ten months of the ancient Romans. It is this era which was prevalent throughout the ancient world for about 1860 years or so, till when about the twelfth century B.C. this era of bissextile intercalary days was, for reasons to be discussed later on, given up and the cycle of five sidereal years of 366 days each was adopted instead. As time advanced and as the five years' cycle became generally known, the rites and ideas connected with the cycle of four years fell into disuse, so much so that about

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[1] Chapter V, Sec. 9, p. 285, Lewis's *Astronomy of the Ancients.*

[2] P. 38, *History of Mexico* by W. H. Prescott.

six or seven centuries before the Christian era, scholars were hardly able to give the exact meaning of a number of Vedic words and passages. Yāska, one of the Vedic commentators, believed to have lived in the sixth century B.C., "gives the names of no fewer than seventeen predecessors whose explanations of the Veda are often conflicting. The gap between the poets and the early interpreters was indeed so great that one of Yāska's predecessors, named Kautsa, actually had the audacity to assert that the science of Vedic exposition was useless, as the Vedic hymns and formulas were obscure, unmeaning, or mutually contradictory. Such criticisms Yāska meets by replying that it was not the fault of the rafter if the blind man did not see it."[1] It is needless to say that the few specks of clouds which covered the Vedic horizon at the time of Yāska grew so much thicker and darker by the time of Sāyaṇa that it may be said without the fear of contradiction that, notwithstanding the inestimable service which Sāyaṇa has rendered by his exhaustive commentary embodying the mass of tradition current at his time in the world of Vedic scholars, its value as a genuine interpretation of a number of passages is almost *nil.*

Prof. Roth, the founder of Vedic mythology, "propounded the view that the aim of Vedic interpretation was not to ascertain the meaning which Sāyaṇa, or even Yāska, who lived eighteen centuries earlier, attributed to the Vedic hymns, but the meaning which the ancient poets themselves intended. Such an end could not be attained by simply following the lead of the commentators. For the latter, though valuable guides towards the understanding of the later theological and ritual literature, with the notions and practices of which they were familiar, showed no continuity of tradition from the time of the poets; for the tradition supplied by them was solely that which was handed down among interpreters, and only

[1] P. 61, Prof. Macdonell's *History of Sanskrit Literature.*

began when the meaning of the hymns was no longer fully comprehended. There could, in fact, be no other tradition; interpretation only arising when the hymns had become obscure. The commentators, therefore, simply preserved attempts at the solution of difficulties, while showing a distinct tendency towards misinterpreting the language as well as the religious, mythological, and cosmical ideas of a vanished age by the scholastic notions prevalent in their own."[1]

"Roth,[2] then, rejected the commentators as our chief guides in interpreting the Ṛigveda, which, as the earliest literary monument of the Indian, and indeed of the Aryan race, stands quite by itself, high up on an isolated peak of remote antiquity. As regards its more peculiar and difficult portions, it must therefore be interpreted mainly through itself; or to apply in another sense the words of an Indian commentator, it must shine by its own light and be self-demonstrating. Roth further expressed the view that a qualified European is better able to arrive at the true meaning of the Ṛigveda than a Brāhman interpreter. The judgement of the former is unfettered by theological bias; he possesses the historical faculty, and he has also a far wider intellectual horizon, equipped as he is with all the resources of scientific scholarship. Roth, therefore, set himself to compare carefully all passages parallel in form and matter, with due regard to considerations of context, grammar, and etymology, while consulting, though perhaps, with insufficient attention, the traditional interpretations. He thus subjected the Ṛigveda to a historical treatment within the range of Sanskrit itself. He further called in the assistance rendered from without by the comparative method, utilising the help afforded not only by the Avesta, which is so closely allied to the Ṛigveda in language and matter, but also by the results of comparative philology, resources unknown to

[1] P. 60, Macdonell's *History of Sanskrit Literature.*

[2] P. 63, Macdonell's *History of Sanskrit Literature.*

the traditional scholar. By thus ascertaining the meaning of single words, the foundations of the scientific interpretation of the Vedas were laid in the great Sanskrit Dictionary in seven volumes, published by Roth in collaboration with Bohtlingk between 1852 and 1875."

Valuable as is this dictionary to the scholar of the Vedas, it has so far failed to help the student to proceed a step beyond what is chalked out by Sāyaṇa. The reason is not far to seek. The Vedas abound with a mass of technical terminology of sacrifices which were periodically following the revolutions of the sun and the moon. It is not clearly known at what intervals of time from each other the Vedic poets performed the different kinds of Soma sacrifices, at what recurring periods of time they performed the Horse-sacrifice, of how many years their Yuga consisted, how and when they were periodically adjusting the luni-solar year, and how they kept the account of elapsing years. Unless these and other facts connected with time are clearly understood, no attempt at an interpretation of the terminology of the periodical sacrifices and of the special deities connected with them can be successful. Sāyaṇa, as is well known, lived at a time when the astronomy of the Hindus had long taken a permanent and, as is believed, unalterable shape with its theory of the four Yugas amounting to 4,320,000 years, and when the periodical sacrifices were performed at any time convenient to the sacrificer. His was the time when the Horse-sacrifice as well as the so-called *Sattras* or sacrificial sessions extending over a number of days, usually from 12 to 360 days and upwards, had long disappeared from the list of sacrifices in observance. His was the time when the method of keeping up an account of elapsing years and of adjusting the luni-solar year entirely differed, as will be seen, from what was in use during the Vedic period. Hence his failure to find a satisfactory interpretation of many Vedic words and sentences. Hence also the failure of oriental scholars to arrive at a

consistent explanation of Vedic thoughts and myths. What the mediæval commentators termed a theological maxim modern critics style a mythological story. Where the former called in the aid of faith to believe, the latter saw superstition. The Vedic poets, for example, now and then speak of the failure of Speech[1] to bring the moon, of the loss of a feather or nail sustained by the bird-like Gāyatrī,[2] a verse of twenty-four syllables, in bringing the moon, and of cows[3] sitting at a sacrifical session extending over a number of days. The commentators attribute these and other exploits narrated in the Vedas and Brāhmaṇas to the tutelary gods or goddesses of speech, of metre, and of cows, while modern European critics regard these stories as mythological legends, having their origin in the wild imaginations of the poets. Thus a new word, 'mythology,' is substituted for theology and superstition for faith. It is, therefore, needless to say that Prof. Roth's opinion of a European scholar being better able to interpret the Vedas than a Brāhman has not, so far, stood the test of facts. Whether that opinion will hold good in future, remains to be seen.

My attempt is to unveil the mystery in which the sacrificial calendar of the Vedic poets is enshrouded, to recover that lost and forgotten era which the poets themselves had invented and continued from 3101 B.C. to about 1260 B.C., and to secure thereby a key to explain a number of theological or mythological stories of the pattern mentioned above.

But before proceeding with the subject I have undertaken, it is necessary that I should assure the scholarly public of the stringent precautions which I have taken against the tendency to 'put new wine into old bottles.'

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[1] Book I, Chapter V, Section 27, *Aitareya Brâhmana.*

[2] Book III, Chapter III, Section 25, *Ibid.*

[3] Kanda VII, 5, 1, *Krishna Yajurveda.*

With the help of grammar and lexicons, it is possible, as has been the practice of many scholars, to twist and split words, to alter the punctuation and shape new sentences in order to extract the desired meaning. A simple thought which an ancient singer wanted to convey by his poetry is thus sometimes converted into a profound, philosophical or mystical idea, and a high-soaring, significant utterance is at other times mistaken for childish prattle. Such are the difficulties which beset the interpretation of the Vedic hymns, when the customs, tradition, and mode of thought of the authors of those hymns have long been forgotten.

But such difficulties and risks are foreign to the subject which I propose to discuss at length. It is a subject which is arithmetical in its character and needs, therefore, no grammatical hair-splitting. The numbers contained in the Vedic passages are plain enough and speak for themselves. What those numbers are, what their purpose, what their basis, and what their aim, is all that I have to point out. Sāyaṇa's interpretation of the Vedas, Prof. Wilson's translation of the Ṛigveda based upon Sāyaṇa's interpretation, Prof. Whitney's literal translation of the Atharvaveda, none of these affects or disproves my theory. My business ends with pointing out what the Vedic poets alluded to and what is the chief purport they meant to convey. One of the most important corroboratary evidences is the analogy of the Mexican with the Vedic calendar. Dr. Von Humboldt is said to have clearly pointed out the striking analogy between the astronomical science of the Mexicans and that of the Hindus. I did not, however, succeed in securing a copy of '*Vues De Cordillers*' in which the doctor is said to have discussed the question. Yet the small amount of information which Prof. Prescott has given about the system of astronomy of the Mexicans is quite sufficient to confirm my theory. Whether the Mexicans borrowed their wonderful knowledge of astronomy from the Hindus, or the latter

from the former, is a question which it is not difficult to decide. The perfect correspondence between the Mexican and the Vedic calendar is a strong evidence of the indebtedness of the Mexicans to the ancient Hindus for their knowledge of astronomy ; for while the Mexicans were not clever enough to advance in their knowledge of astronomy beyond the stage at which they seem to have borrowed it, their teachers, the Hindus, have on the other hand, made considerable progress in that branch of knowledge and brought that science from its primitive, though wonderful, form as found among the Mexicans to what is found in the astronomical treatise of Āryabhaṭa.

I may presume that with this assurance the reading public, whether expert or lay, will be kind enough to go through this humble work of mine and check for themselves the accuracy of this arithmetical subject.

CHAPTER I.

The Year

LIKE all other civilized nations of antiquity, the Hindus of the Vedic period appear to have arrived at a clear and correct conception of the year. The rotation of the seasons, such as the summer, the rainy season, and the winter seems to have struck the mind of almost all ancient peoples and acquainted them with the period of twelve lunations as the interval of the recurrence of the seasons. In the course of a few years after beginning the practice of counting the year by twelve lunations, or by about 354 days, they must have perceived the difficulty of fixing the seasons at their proper places in the year. It needs no proof that the true conception of the arrival and departure of the seasons is essential to all agricultural people. No one who has read at least a portion of the Ṛigveda will doubt that agriculture was the one important profession and that sacrificial performance on new and full moon days was a religious duty of the Vedic Āryans. It is more than probable that in their attempt to determine the duration of each one of the seasons in the interests of their agricultural operations and to fix the new and full moon days for the correct performance of their sacrifices, the Vedic poets experienced immense trouble and confusion. Regarding the confusion in seasons occasioned of course by the adoption of the lunar instead of the tropical year, the Śatapatha Brāhmaṇa (Kāṇḍa VI. 1, 4,) says as follows :—

" Now the seasons were desirous to have a share in the sacrifice among the gods, and said, ' Let us share in the sacrifice! Do not exclude us from the sacrifice! Let us have a share in the sacrifice! ' The gods, however,

did not approve of this. The gods not approving, the seasons went to the Asuras, the malignant, spiteful enemies of the gods. Those (Asuras) then throve in such a manner that they (the gods) heard of it; for even while the foremost (of the Asuras) were still ploughing and sowing, those behind them were already engaged in reaping and threshing: indeed even without tilling, the plants ripened forthwith for them."[1]

All that is implied in this passage is that the two classes of people, the Devas and the Asuras, whoever they might be, whether the Hindus and the Zoroastrians, or the invading Āryans and the aboriginal natives of India, were in such confusion about the identification of the seasons that what one class considered as sowing season the other regarded as harvest time.

"Seasons may be confounded" (VI. 5, 3), and "seasons hold to their proper places, if periodical sacrifices are properly attended to" (VI. 3, 3, 18 and VII, 1, 10), are expressions which frequently occur in the Black Yajurveda.

It follows, therefore, that the Vedic poets found out by trial the insufficiency of the lunar year to measure the duration of the seasons and succeeded in distinguishing the four kinds of years, the lunar of 354 days, the civil (Sāvana) of 360 days, the tropical of $365\frac{1}{4}$ days as will be seen later on, and sidereal year of 366 days. Regarding the adjustment of the lunar with the sidereal year, the following passage occurs in the Śatapatha Brāhmaṇa (XI. 1, 2, 10).

"Verily, those who perform the full and new moon sacrifice run a race. One ought to perform it during fifteen years:—in these fifteen years, there are three hundred and sixty full moons and new moons; and there are in a year three hundred and sixty nights. It is the nights

[1] Prof. Eggeling's translation.

he thus gains. He should then offer for another fifteen years; in these fifteen years, there are three hundred and sixty full moons and new moons; and there are in a year three hundred and sixty days. It is the days he thus gains."[1]

Readers of the Bhagavadgītā[2] need not be told that the Hindus regard as nights the days of the six months of the Dakshiṇāyana, the southern movement of the sun from summer solstice to winter solstice, and as days those of the sun's northern movement from winter solstice to summer solstice. Accordingly, the above passage means that in the course of fifteen sidereal years, the sacrificer would gain 180 days of 24 hours each, or 360 nights of 12 hours each, the 180 days of 12 hours each, being regarded as nights in the Dakshiṇāyana; in other words, he would gain six intercalary months in fifteen sidereal years as each sidereal year of 366 days exceeds each lunar year of 354 days by twelve days, and fifteen sidereal years would produce $15 \times 12 = 180$ intercalary days. Likewise in the course of another fifteen years, he would gain another six months.

It appears from the above passage that in this cycle of 30 sidereal years no intercalation of any sort was made so as to keep the lunar year to the season, but that the lunar year was allowed to retrograde through all the seasons and begin again with the real season at the close of 30 sidereal years. But the Black Yajurveda refers to two different astronomical schools, one school (the Utsargins) making occasional intercalation, and another allowing the lunar year to run on and adjust itself. In defence of the school of no intercalation it speaks as follows :—

" तदाहुर्यां वै त्रिरेकस्याह्न उपसीदंति दह्रं वै साऽपराभ्यां
दोहाभ्यां दुहेऽथ कुतस्सा धोक्ष्यते यां द्वादशकृत्व उपसीद-

[1] Prof. Eggeling's translation.

[2] *Bhagavadgita*, VIII. 24, 25.

तीति. संवत्सरं संपाद्योत्तमे मासि सकृत्पृष्ठान्युपेयुस्तद्यजमाना यज्ञं पशूनवरुंधते । समुद्रं वै एतेऽनवारमपारं प्रप्लवंते ये संवत्सरमुपयंति." VII, 5, 3.

" Hence they declare :—(the cow) by whom they sit for milking three times a day will only yield a little quantity in the two next milkings. Then how can that cow be milked at all by whom they sit for milking twelve times? Hence having gained the year at the last month, they once for all observe all the periods of six days called Prishṭhas. It is thus that sacrificers keep their sacrifice (year) and also the cows unmilked. Such sacrificers as attain an (intercalary) year are, as it were, sailing on a vast ocean bounded by no shores."

The three milkings in connection with the year are the three intercalary periods of four months each; and the twelve milkings are the twelve intercalary months added twelve times; the word 'pṛishṭha' is a name of a period of six days which appears to have been a unit of time or week during the Yajurvedic period.

The objection raised against this school of no intercalation is thus stated :—

" यदहर्नोत्सृजेयुर्यथा दृतिरुपनद्धो विपतत्येवं संवत्सरो विपतेत् । आर्तिमार्च्छेयुः । पौर्णमास्या मासान् संपाद्याहरुत्सृजंति संवत्सरायैव तदुदानं दधति. तद् सत्रिण उदानंति नार्तिमार्च्छंति. पूर्णमासे वै देवानां सुतः " VII, 5, 6.

" If they do not omit the day, then just as a leathern bag puffed up with wind breaks down, so the year falls down and they get into trouble. The day which they omit (*i.e.* intercalate) gaining the month by the full moon bestows life on the year. Hence the priests who hold the sacrificial session sustain their life, but do not get into trouble. It is on the full moon day that the oblation of soma juice (suta) is offered to the gods."

The question of intercalation or no intercalation seems to have been a matter of heated discussion among the astronomers of the Vedic period. The seriousness of the question is even now indicated by lengthening of the voice in pronouncing the last syllable of the words 'omit' or 'not omit' in the Yajurvedic passage referring to the subject. The passage runs as follows :—

"उत्सृज्यां ३ नोत्सृज्या ३ मिति मीमांसंते ब्रह्मवादिन: तद्वाहुरुत्सृज्यमेवेत्यमावास्यां च पौर्णमास्यां चोत्सृज्यमित्याहुरेते हि यज्ञं वहत इति नै त्वाव नोत्सृज्ये इत्याहु: ये अवांतरं यज्ञं भेजाते इति." VII, 5, 7.

"'Should I omit—or should I not omit' thus discuss the Brahmavādins. They declare that it should necessarily be omitted; they say that it should be omitted on the new moon day as well as on the full moon day, inasmuch as those are the days which bear the sacrifice. But those who declare that it should not be omitted say so for the reason that those (new and full moon days) bear a special sacrifice."

It is not, however, clearly stated whether the question of intercalation of a day, of a month, or of four months, or the question of no intercalation was raised with reference to sidereal or tropical years. Still as the above discussion is made in connection with the sacrificial session called the 'Gavām āyana' or 'Cows' Walk,' and as the 'Cows' Walk' is, as will be seen, a period made up of bissextile intercalary days kept and counted apart, the above passages must necessarily refer to the question of observing or not observing a leap year of 366 days. Whatever might be the form of intercalation referred to in the above passages, whether it was with reference to the adjustment of the lunar with the sidereal or tropical year, or whether it was with regard to the adjustment of the fractional part of a day of the tropical year, this much, however, is quite certain that the vedic poets were quite

familiar with the problem of intercalation. But it is a self-evident fact that no people can talk or dream of intercalation, unless they have devised a means to count the years, months, and days and to check any error committed in the reckoning. It follows, therefore, that the Vedic poets had made some contrivance to count the years, months, and days from some starting point of their own selection. But it is a fact beyond dispute that during the Vedic period, whatever its date might be, the art of writing was unknown. In the absence of writing the burden of keeping up the account of any matter entirely depends upon memory. It needs no mentioning that the Vedic poets took full advantage of the powers of memory and cultivated them strongly. As the only means of preserving an account of elapsed years from the commencement of their reckoning, they seem to have hit upon the plan of composing at the close of each year verses in one or more metres, so that the total number of syllables contained in the verses should amount to 360, corresponding to the number of days in the so-called Sāvana or civil year. The Pāriplavopākhyāna or the narration of revolving cycle described in the Śatapatha Brāhmaṇa (XIII. 4, 3, 1-15) corroborates this view. While commenting on recitation by the Hotṛi priest of verses relating to some ten ancient kings and their exploits, on the occasion of the periodical Horse-sacrifice, the Śatapatha Brāhmaṇa says thus:—

" In telling this revolving legend, he tells royalties, all regions, all Vedas, all gods, all beings; and, verily, for whomsoever the Hotṛi knowing this, tells this revolving legend, or whosoever even knows this, attains to fellowship and communion with these royalties, gains the sovereign rule and lordship over all people, secures for himself all the Vedas, and, by gratifying the gods, finally establishes himself on all beings. This very same legend revolves again and again for a year; and inasmuch as it revolves again and again, therefore it is called the revolving

(legend). For thirty-six ten-days' periods, he tells it—the Bṛihatī metre consists of thirty-six syllables, and cattle are related to Bṛihatī metre: by means of the Bṛihatī he thus secures cattle for him." [1] XIII. 4, 4, 15.

The contrivance of representing a day with a syllable is still more clearly stated in the Aitareya Āraṇyaka[2] :—

"This becomes perfect as a thousand of Bṛihatī verses, and of that hymn perfect with a thousand Bṛihatī verses, there are 36,000 syllables. So many are also the thousands of days of a hundred years (36,000). With the consonants they fill the nights, with the vowels the days."

It is clear from the above passages that the Vedic poets divided the civil year of 360 days into ten periods of 36 days each, represented those ten periods by ten different animal signs, and also kept an account of the days of each year in ten Bṛihatī verses of 36 syllables each composed at the close of each year or of a fixed number of years. The division of the year into 36 decans is said to have also been known to the Egyptians[3] so far back as the first few centuries before the Christian era. As both nations cannot be believed to have devised the same system independently, and that too, at different periods of time, it follows that the Egyptians must have borrowed it from the Āryans with whom it was, as will be seen, in use at an earlier period. Hence our contention is that year after year the number of the Vedic hymns increased at the rate of 10 verses of 36 syllables each per year, serving the double purpose of recording the number of elapsed days and of offering prayers to the gods significant of meaning.

The word 'Veda' itself implies this idea. It is used in two senses:—(1) a number of Kuśa[4] grasses; (2)

[1] Prof. Eggeling's translation.
[2] Max Muller's translation.
[3] See *Encyclopædia Britannica*, under Zodiac.
[4] See Pp. 42 and 79, Haug's translation of *Aitareya Brahmana*.

and a collection of sacred verses. Literally it means 'Knowledge.' It is therefore clear that it must have meant to the Vedic poets the knowledge of a number of Kuśa grasses and of a number of the syllables of the sacred verses corresponding to a number of days elapsed since the beginning of their era. It is still a custom with the Hindus to make a *veda*, *i.e.* in all sacrifices to bind together a fixed number of Kuśa grasses and to throw the bundle into the fire at the close of the sacrifice. The Mexicans are stated to have been making a bundle of reeds consisting of as many pieces as the years or the days of their cycle. "They threw the years," says Prescott[1] in his *History of Mexico*, "as already noticed into great cycles of fifty-two years each, which they called 'sheafs,' or 'bundles,' and represented by a quantity of reeds bound together by a string." It seems therefore, very likely that what the 'sheafs' or 'bundles' of reed were to the Mexicans, the Veda or Kuśa grass was to the Vedic poets. While the hymnal Veda appealed to the mind and the ear, the grassy Veda would impress the eye. Thus these two forms of the Veda seem to have proved a reliable method of counting the years and days and checking possible errors. While the grassy Veda was only kept as long as the duration of a cycle of four or fifty-two years, and thrown into the fire at the close of the cyclical sacrifice, the hymnal Veda, consisting of old and new compositions in exact correspondence to the number of days of the years that had elapsed from the first day of reckoning up to the day of any sacrifice was so carefully committed to memory that there could be neither the loss nor the addition of even a syllable to the hymns. That the Brāhmans bestowed and are still bestowing the utmost care upon the preservation of the Vedas is a fact known to all Oriental scholars. But whether the total number of syllables of the Vedas has been so carefully

[1] See P. 36, Edition, 1843.

preserved, without giving room to any later interpolation, that they can be taken to represent the number of days during which they took their present shape, and whether any later changes were made and the order of the hymns and formulas was recast, are questions that cannot be answered decisively. The existence, however, of different redactions of the same Veda, as for example, the three extant recensions of the Yajurveda in the form of the Black Yajurveda, the White Yajurveda, and the Maitrāyaṇīya redaction, all differing from each other in the arrangement of matter and in reading here and there, seems to be a strong proof that the Vedas have undergone some material changes, perhaps, both in matter and form. Still, that for a number of years, the Vedas served the double purpose of offering prayers to the gods and of recording at the same time the number of elapsed days, is a theory which is sought to be established here. The following verses from the Ṛigveda may be cited in further proof :—

"Like[1] the unborn (sun), he (Agni) sustains the earth and the firmament and *props up the heaven with true prayers*." R. V. I. 67, 3.

"Whether the *holy grass be* cut for the rite that brings down blessings, whether the priest repeats the *sacred verse* in the brilliant sacrifice . . . . . . on all these occasions Indra rejoices." R. V. I. 83, 6.

"Maghavān, possessing a name that is to be glorified, offers to him who celebrates it these revolving ages of man." R. V. I. 103, 4.

"*These revolving ages are devoted to thee*, as well as the ceremonies addressed to the gods, and the virtuous acts of man." R. V. III. 60, 6.

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[1] These and other quotations from the Rigveda are as translated by H. H. Wilson.

"To those, Agni, who *repeat new praises to thee*, the object of their worship, *from age to age (yuge yuge)*, grant riches and famous prosperity." R. V. VI. 8, 5.

"Our forefathers, the Angirasas, by their praises (of Agni) terrified the strong and daring devourer (Paṇi); *by the sound they made for us a path to the vast heaven and obtained the accessible day, the ensign of day, and the cows* (that had been stolen)." R. V. I. 71, 2.

"Mount, Indra, thy steeds which are young and vigorous and *tractable* to prayer." R. V. I. 177, 2.

"Desirous of milking thee like a milch cow at pasture, Vaśishtha *has let loose* his prayer to thee: every one proclaims thee the lord of cattle: may Indra *be present* at our praises." R. V. VII. 18, 4.

"*I harness* by praises the kine-bestowing chariot of Indra with his horses." R. V. VII, 23, 3.

"Let the days and nights *sit down* upon the grass." R. V. VII. 42, 5.

"Grass *preserved* by prayer." R. V. IV, 62, 5.

"*Fastening* the traces of horses by praises." R. V. V. 33, 2.

"Chariot (year) *laden* with praises." R. V. IV. 44, 1.

"Induced by praises of men, Indra *returns* like a *revolving wheel* to use" R.V. IV, 31, 4.

"*Bearer* of prayers, these prayers are offered by us: *sit down* on the grass." R. V. III. 41, 3.

These and other verses too numerous to quote here clearly indicate a close connection of prayers and grass with days. The Vedic poets cannot be believed to have meant any other theological or mythological connection than the one dictated by common sense, of representing and counting the days by syllables, reeds,

and animal signs. Indra and Agni are, as will be seen, the names of some special new and full moon days, the return of which, as calculated by the syllables of the prayers, is the sole theme of these and other verses of the Ṛigveda. We can now clearly understand what is meant by the story[1] of Speech going in the form of a bird or of a cow to bring the moon. The the story of the loss[2] of two or three syllables sustained by the metres, such as the Jagatī and the Trishṭubh, will have its origin in the practice of calculating the days by syllables. If the expected new or full moon day occured two or three days later, the poet would in his conventional terminology say that this or that metre fell short by two or three syllables in bringing the moon. Similarly, no other explanation than the one suggested above can be given of the custom[3] of spreading dry and green darbha grasses, the former representing the day, the latter the night, on the two posts in the centre of the sacrificial hall, and of the custom of reciting prayers looking at these grasses.

It is therefore clear that by composing at the expiry of each cycle (*yuge yuge*) a fixed number of verses consisting of as many syllables as the number of days in the cycle, the Vedic poets kept an account of the days gone by and were thus able to pre-determine the new and full moon days, the time of intercalation, and the periodical sacrificial days. Accordingly the author of the Śatapatha Brāhmaṇa goes so far as to total the number of the syllables of the whole Ṛigveda and find out the total number of years that have elapsed :—

" Prajāpati bethought himself, ' Truly, all existing things are in the threefold lore : well, then, I will construct for myself a body so as to contain the whole threefold lore.

[1] See Haug's translation of *Aitareya Brah.* I, 5, 27.
[2] See *Aitareya Brah.*, Book III, Chap. 3, Sec. 25.
[3] *Ibid.* Book I, 5, 29 and Book I, 4, 26.

"He arranged the Ṛik-verses into twelve thousand of Bṛihatīs[1] (of 36 syllables each), for of that extent are the verses created by Prajāpati. At the thirtieth arrangement they came to an end in the Panktis[2] (of forty syllables each); and because it was at the thirtieth arrangement that they came to an end, there are thirty nights in the month; and because it was in the Panktis, therefore Prajāpati is Pānkta (fivefold).[3] There are one hundred-and-eight-hundred Panktis.

"He then arranged the two other Vedas into twelve thousand Bṛihatīs,—eight (thousand) of the Yajus (formulas), and four of the Sāman (hymns)—for of that extent is what was created by Prajāpati in these two Vedas." Śata. Brah. X, 4, 2, 22-24.

As Prajāpati is identified[4] with the year and with the moon in the Brāhmaṇa itself, the word Prajāpati in the above passage may be taken in the sense of 'year'. Accordingly Prajāpati's body must mean an era or a series of years. The year adopted by the Vedic poets was, as will be seen later on, the Sāvana or civil year of 360 days, which they adjusted with the solar year of $365\frac{1}{4}$ days by adding 21 days to every fourth civil year. Hence the 12,000 Bṛihatī verses of 36 syllables each of the Rigveda would give 432,000 syllables equivalent to 432,000 days or 1,200 civil or tropical years. By the 'thirtieth arrangement,' the author seems to mean the reduction of the whole Ṛigveda, which consists of verses composed in various metres into Pankti verses of 40 syllables each. Thus the author of the Śatapatha seems to take the Ṛigvedic period to be equal to 1,200 years. He assigns a similar period to the growth of the Yajurveda and the

[1] That is $12,000 \times 36 = 432,000$ syllables.

[2] The Pankti consists of five feet of eight syllables each.

[3] That is to say, 10,800 Panktis, which, as the Pankti verse has forty syllables, again amount to 432,000 syllables.

[4] See Prof. Eggeling's Introduction, p. xxii, Vol. IV, Translation of the *Satapatha Brâhmana*.

Sāmaveda, implying thereby that the whole Vedic period is equal to 2,400 years. But according to other calculations to be discussed later on, the whole of the Vedic period, inclusive of that of the Brāhmaṇas, amounts to something less than 2,400 years. Hence it is likely that neither the Yajurveda which is, as it were, a commentary on the Ṛigveda and contains a number of Ṛik-verses, nor the Sāmaveda, which is merely another form of the Ṛigveda, adopted to chanting verses according to a musical mode, seems to have ever been meant like the Ṛigveda for numbering the days.

But so far as the Ṛigveda is concerned, there is reason to believe that it did serve the purpose of recording a period of 1,200 years; for it is on these numbers, 12,000 and 432,000, that later Indian astronomers seem to have based their huge Yuga theory. I shall revert to this subject later on. For the present, it is enough if we bear in mind that the peculiar contrivance which the Vedic poets devised to keep an account of the lapse of days or years was the number of the syllables of the verses which they composed and committed to memory cycle after cycle.

CHAPTER II.

The Sacrificial Session of Gavam Ayana or Cows' Walk.

IT is in sacrificial terminology that the Vedic poets kept their calendar. The day on which a periodical sacrifice was performed was, for instance, called after the name of that sacrifice. Those days on which no sacrifices were performed were spent in prayer, and were therefore called after the number of the verses contained in the prayer hymns. Thus an Agnishṭoma day meant to them that day on which the animal sacrifice, called Agnishṭoma, was performed. Similarly, those days on which 4, 9, 15, 17, 21, 24, 27, 33, 44, or 48 verses, called 'stomas,' were recited were styled four-versed day, nine-versed day, fifteen-versed day, seventeen-versed day, and so on. It was also usual with them to call the day after the name of any one of the six musical chants (Sāmans) sung on that day. The six musical chants termed 'Pṛishṭha Stotras' are the Rathantara, Bṛihat, Vairūpa, Vairāja, Śākvara, and Raivata Sāmans. Accordingly, the day on which the Rathantara chant had to be recited was called Rathantara day and the day on which the Bṛihat Sāman had to be recited was termed Bṛīhatī day, and so on. The so-called 'Pṛishṭha Shaḍaha' seems to be nothing but a week of six days on each of which the above six Pṛishṭha Stotras or chants were sung in order. It seems that by means of the Stomas or of the Pṛishṭhas the Vedic poets identified or distinguished the days; for Āsvalāyana says in his Śrauta Sūtra :—

अह्नां तु संशये स्तोमपृष्ठसंस्थाभिरेके व्यवस्थाम् ।

X, 5, 18.

"Some say that in case of doubt in (identifying) the days, decision is to be arrived at by referring either to the Stomas or to the Prishṭhas."

Hence it will be scarcely possible to understand the nature of their calendar, unless the chief features of the different kinds of sacrifices they performed are known.

The New and Full Moon Sacrifices.

All Vedic sacrifices are performed after the model of new or full moon sacrifices. Each of these two half-monthly sacrifices which a house-holder has to perform either for a period of 15 or 30 years usually occupies two days for its performance. The fourteenth day of each half-month is taken up with the preparatory rites, such as the collection of sacrificial material, the sweeping and trimming of the fireplaces, and the taking of the vow of abstinence. The next day, *i.e.* the full or new moon day, the sacrificer, assisted by four priests, performs a set of ceremonies, such as sweeping the hearths of the three fires, the Gārhapatya, the Dakshiṇāgni, and the Āhavanīya : kindling the fires, throwing the prescribed number of sacred wooden sticks over the fires, and preparing cakes, he makes final oblations and offerings in the evening, all acts being accompanied by recitations and chants of a prescribed number of verses and formulas. Sacrifices performed after this model are called Haviryagnas; while those sacrifices in which cooked rice is offered, observing at the same time the details of the above Haviryagna sacrifice are called Pākayagnas. Each of these two kinds of sacrifices is further divided into seven forms. The time for the performance of all these fourteen varieties of sacrifice is strictly the new or full moon day. There are also seven Soma sacrifices in which, in addition to animal offerings, certain cups of Soma juice are extracted and consumed by the priests after libations are duly made to respective deities therefrom. In his commentary

on the Black Yajurveda (VII. 5, 2.) Sāyaṇa classifies Soma sacrifices as follows:—

"Soma sacrifices are of two kinds: (1) those that recur, and (2) those that do not recur. Those Soma sacrifices which take one day for their performance are such as do not recur. The recurring sacrifices are again of two kinds: (1) Ahīnas, and (2) Sattras. Such sacrifices as take from two to eleven days for their performance are called Ahīnas, while those which take more than thirteen days are termed Sattras or Sacrificial Sessions. Those sacrifices which take twelve days may be either Ahīna or Sattra. The Sattras are also of two kinds: (1) Rātri Sattra and (2) Ayana Sattra. Those sacrificial sessions which last for a hundred nights are called Rātrisattras, while those which take more than a year are termed Ayana Sattras. All these Soma sacrifices are performed after the model of the sacrificial session called the 'Gavām Ayana' or 'Cows' Walk.'"

Under the head of one-day Soma sacrifices come the Agnishṭoma, Atyagnishṭoma, Ukthya, Shoḍaśi, Atirātra, Vājapeya, and Aptoryāma. The Agnishṭoma is a simple one-day sacrifice in which a he-goat, sacred to Agni, is immolated and twelve hymnal verses are chanted.

In the Atyagnishṭoma a goat to Indra is offered and twenty-nine hymn verses are chanted.

The Ukthya sacrifice requires the immolation of a second victim, a he-goat to Indra and Agni, and the chanting of fifteen verses.

In the Shoḍaśi sacrifice, a third victim, a ram to Indra, in addition to the two of the Atyagnishṭoma, is immolated and sixteen Stotras are chanted.

The Atirātra sacrifice requires a fourth victim to Sarasvatī, goddess of speech, and the recitation of twenty-seven verses. At daybreak, a twilight chant consisting of six verses as well as the great Āśvina Śastra or Morning

Litany, a collection of hymns consisting of about a thousand Bṛihatī verses of 36 syllables each are recited inviting the sacrificial dawn of the day on which the intended Soma sacrifice is to be performed.

In the Vājapeya seventeen victims are immolated and a seventeen-versed hymn is recited. The most interesting feature of this sacrifice is a chariot-race like the Olympic game of the Greeks. The sacrificer and his sixteen assistants hold a chariot-race round the sacrificial ground and the sacrificer himself is usually the winner.

The Aptoryāma, *i.e.* that in which the sun is recovered, is an animal sacrifice requiring thirty-three or forty-eight chants. The number of animals required is not, however, exactly mentioned.

Besides the above twenty-one sacrifices there are also mentioned in all the ritualistic manuals a number of other kinds of sacrifices, such as the Horse-sacrifice, the Rājasūya, a sacrifice performed by a king to celebrate his conquests, and the 'Agni-chayana', or construction of the Great Fire-altar.

In the Ahīna sacrifice lasting for eleven or twelve days, all the priests, usually not less than three and not more than twelve, mix[1] their respective sacrificial fires and act as if each were the chief sacrificer. The number of animals offered up and the number of verses recited are correspondingly greater than in the one-day sacrifices.

In the Gavām Ayana, or Cows' Walk, twenty-four priests take part. As shown above, it may last from twelve to any number of days. The number of animals to be immolated in the 'Cows' Walk' sacrifice of 360 days is thus enumerated by Bodhāyana in his Śrauta Sūtra.

अथ द्वात्रिंशदेकादशिन्यो गवामयने. तेषां पूर्वस्मि-
न्पक्षसि षोडश निष्ठीयंते सप्तदशमध्याया एकादशिन्या बा-

[1] See *Apastamba Srautasutra*, XXI. 2, 1—4.

र्हस्पत्यो वैषुवते सवनीयस्संपद्यते. तस्य नवाहान्यपशुकान्य-
तिरिच्यंते.[1]

"In the Cows' Walk sacrifice, thirty-two sets of eleven victims are offered. Of these, sixteen sets are done with in the first half of the sacrificial year. Of the seventeenth set, that victim which is dedicated to Bṛihaspati is offered on the central day. There remain nine more days (in the second half) with no sacrificial victims."

What Bodhāyana means is this:—The 'Cows' Walk' consists of 360 days. For these three hundred and sixty days the set of eleven victims described in the Yajur-veda[2] are repeated thirty-two times, making on the whole 352 victims. On the central day, *i.e.* the 180th day, one victim more than the usual one is immolated. Hence there will remain 171 victims for the remaining 180 days. Hence there are no victims for the last nine days.

What kind of sacrificial offerings are to be made on these nine days, is not, however, stated by Bodhāyana. All that he says is that at the close of these nine days musical performances and dancing by women in honour of the arrival of the spring season should be the special feature of the last day. But both Āśvalāyana and Āpas-tamba prescribe nine special victims for these nine days. This is what Āśvalāyana says:—

"The sacrificer has to offer one of the eleven victims on each day. The number of animals immolated should not, however, exceed or fall short of a set of eleven victims. Hence he should not take up victims out of the set of eleven victims for the last nine days that remain after thirty-two sets of eleven victims are done with. The nine special victims that ought to be offered on these days are: (1) a dwarfish animal dedicated to Vishṇu, (2) an animal sacred to Indra and Agni, (3) one dedicated to

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[1] P. 75. Paper Manuscript, A 282, Government Oriental Library, Mysore.

[2] *Krishna Yajurveda* VI, 6, 5.

the All Gods, (4) a cow sacred to earth and heaven, (5) a calf sacred to Vāyu, (6) a barren cow sacred to the sun, (7) another barren cow to Mitra and Varuṇa, (8) a bull sacred to Viśvakarma, (9) an animal dedicated to Agni on the last ninth day, or, he may make up thirty-three sets of eleven victims by offering two victims on each of the three consecutive days from the central day."[1]

For the purpose of binding the victims, a set of eleven stakes is said to be erected in a row on the sacrificial ground.[2] Near the central stake a rough-hewn log of wood is placed (not erected) forming a twelfth stake. (1) A victim whose neck is black is bound to the central stake and dedicated to Agni; (2) a she-goat sacred to Sarasvatī is tied to the stake which is north to the central one; (3) an animal of reddish colour and sacred to Soma is bound to the stake which is south to the central one; (4) a black animal sacred to Pūshan is bound to the second northern stake; (5) an animal with white hips and sacred to Bṛihaspati is bound to the second southern stake; (6) a victim of variously coloured skin and sacred to the All Gods is tied to the third northern stake; (7) an animal with long horns and sacred to Indra is tied to the third southern stake; (8) a spotted animal sacred to Vāyu is tied to the fourth northern stake; (9) a brown victim sacred to Indra and Agni is bound to the fourth southern stake; (10) a white animal sacred to the sun is bound to the fifth northern stake; (11) and a black deer sacred to Varuṇa is bound to the fifth southern stake. The sacrificer is asked to symbolically bind his enemy to the twelfth stake. 'If he has no enemy,' says the Krishṇa Yajurveda, 'he may bind a rat to it' (VI, 6, 4). This rat is not, however, immolated, but is let off after the ceremony of circumambulation with fire is over. Āpastamba says (XXI, 14, 12) that the ceremony connected

[1] *Asvalâyana*, XII, 7, and *Apastamba*, XXI, 23.

[2] P. 159, *Bodhâyana Srauta Sutra*, Ms. No. A 282, Mysore Oriental Library. Also see *Krishna Yajurveda*, VI, 6, 4.

with the twelfth stake and its victim should each day be repeated during the sacrificial session.

Thus we are given to understand that during the sacrificial session, known as the 'Cows' Walk' of 360 or 361 days, the sacrificer has to repeat thirty-two times the offering of the set of eleven victims and observe the special ceremony in connection with the fortunate rat on all the three hundred and fifty-one days. During the remaining nine days he has to take up some nine more special victims, not of the type of the set of eleven, but of different pattern as pointed out. Or, he may complete thirty-three rounds of eleven, disposing of the three odd animals on the three central days. A question that crops up of itself is whether such a huge sacrifice was ever performed? And if so, what was its object? Why are the same victims arranged into sets of eleven each? Why was a twelfth animal sought for with each of the 352 or 363 animals? 'It was all superstition,' we may say in one word. But this does not satisfactorily answer the questions. It may be a superstitious performance for later time. But in its origin, it must have had a rational basis; for superstition has nothing to do with numbers, multiplication, and the disposal of remainders.

Again, in connection with the 'Cows' Walk' sacrifice a curious legend is narrated in the Krishṇa Yajurveda[1] and the Brāhmaṇas. The story told in the Aitareya Brāhmaṇa (Book IV, Chapter 3, Section 17) is thus translated by Prof. Martin Haug.

"They hold the Gavām Ayana, *i.e.* the sacrificial session, called 'Cows' Walk.' The cows are the Ādityās (gods of the months). By holding the session called the 'Cows' Walk' they also hold the walk of the Ādityās.

The cows, being desirous of obtaining hoofs and horns, held (once) a sacrificial session. In the tenth

[1] VII, 5, 1-2, *Krishṇa Yajurveda.*

month of their sacrifice they obtained hoofs and horns. They said, 'We have obtained fulfilment of that for which we underwent the initiation into the sacrificial rites. Let us rise (the sacrifice being finished).' When they arose, they had horns. They, however, thought 'Let us finish the year,' and recommenced the session. On account of their distrust their horns went off, and they consequently became hornless (*tūpara*). They (continuing their sacrificial session) produced vigour (*ūrj*). Thence after (having been sacrificing for twelve months and) having secured all the seasons, they rose again at the end. For they had produced the vigour to reproduce horns, hoofs, etc. when decaying). Thus the cows made themselves beloved by all (the whole world) and are beautified (decorated) by all."

How did this story bordering on absurdity originate? What is the meaning of a cow or a number of cows holding a session of sacrifice of three hundred and sixty days and of their securing all the seasons and producing *ūrj*, which is the name[1] of one of the twelve Vedic months? To add to the apparent absurdity of the story, a number of sacrifices are enumerated as making up this grand sacrificial session. The Gopatha Brāhmaṇa enumerates in the form of a dialogue all the sacrifices pertaining to the 'Cows' Walk.'

कतिस्विद्रात्रयः ? कत्यहानि ? कति स्तोत्राणि ? काति शस्त्राण्यस्य ? कति चित्सवनाः ? संवत्सरस्य स्तोत्रियाः पदाक्षराणि कत्यस्य ? द्वावतिरात्रौ षट्छतमग्निष्टोमाः द्वे विंशतिशते उक्थ्यानां । द्वादश षोडशिनः षष्टिष्षडहा वैषवतं च ॥ अहान्यस्य विंशतिशतानि त्रीण्यहश्चैकं तावदस्य । संवत्सरस्य सवनाः सहस्रमशीतिः त्रीणि च संस्तुतस्य ॥ *Gopatha Br.* V, 2 3.

[1] *Krishna Yajurveda*, I. 4, 14.

"How many are the nights? how many days? how many chants? how many recitations? how many mornings, mid-days, and evenings (Savanas) in the yearly session? and how many are the syllables in the hymnal words?

"Two are the Atirātra sacrifices; one hundred and six are the Agnishṭoma sacrifices; twice hundred-and-twenty are the Ukthya sacrifices; twelve are the Shoḍaśī sacrifices; sixty are the six days' sacrifices; one is the Vishuvan sacrifice: the days of this samvatsara are thrice one hundred-and-twenty and one more (361); the Savanas in this samvatsara are one thousand and eighty three."

Similarly the Śatapatha Brāhmaṇa (xii, 2, 1, 6-7) says:—

"How many Atirātras are there in the year? how many Agnishṭomas? how many Ukthyas? how many Shoḍaśins? and how many Shaḍahas?

"Two Atirātras, a hundred and six Agnishṭomas, and two hundred and forty Ukthyas; thus in the case of those who perform the Svarasāmans (the three days before and after the central day) as Ukthyas. But in the case of those who perform them as Agnishṭomas, two hundred and thirty-four Ukthyas, twelve Shoḍaśins, and sixty Shaḍahas. This, then, is *how the year is obtained*."[1]

There can be no doubt that this samvatsara known as the 'Cows' Walk' can by no means be an ordinary year of 360 or 361 days; for if it were an ordinary year, it would imply the performance of about 421 sacrifices in 361 days, an inference which is not merely absurd, but requires what is impossible to observe. Neither the Vedas nor any other ritualistic manuals warrant the practice of performing more than one sacrifice a day. Nor can it be said that the name, 'samvatsara,' year, was given to the

[1] This is Pro. Eggeling's translation. Compare also *Vaitana Sutra*, 31, 15.

'Cows' Walk,' simply because the number of days during which it was held is analogous to the number of days of a civil year; for there is no rule restricting the number of days constituting the 'Cows' Walk' to 360; but on the contrary the maximum number of days is, according to all authorities unlimited, and can extend to infinity, the minimum being not less than twelve. Also in proportion to the increase in the number of days, there seems to be a corresponding increase in the number of sacrifices as well. According to the Śatapatha Brāhmaṇa (XII. 2, 2—5 and 6) the unit of a sacrificial session is a month of thirty days and the number of sacrifices in it is said to be nine Agnishṭomas and twenty-one Ukthyas. But Āśvalāyana takes the unit to be twenty-five days and quotes the following passage in support :—

तदेषाऽभियज्ञगाथा गीयते

'प्रायणीयश्चतुर्विंशं पृष्ठ्योऽभिप्लव एव च । अभिजित्स्वरसामानो विषुवान् विश्वजित्तथा ॥ छंदोमा दशमं चाहरुत्तमं तु महाव्रतम् । अहीनैकाहस्सत्राणां प्रकृतिस्समुदाह्रियते ॥ यद्यन्यधीयते पूर्वधीयते तं प्रतिग्रामंत्यहानि पंचविंशतिर्ये वै संवत्सरो मितः । एतेषामेव प्रभवस्त्रीणि षष्टिशतानि यदिति.' VII, 13, 31.

"Accordingly the sacrificial song is thus chanted:—

1 The Prāyaṇīya or initial day.
1 The Chaturvimśa or the sacrificial day on which twenty four verses are chanted.
6 days known as Pṛishṭhyas.
6 days known as Abhiplavas.
1 Abhijit or conquering day.
3 days termed as Svarasâmans.

1 The central day known as Vishuvan.
1 The Viśvajit or all conquering day.
3 days known as Chandomas.
1 The tenth day.
1 The Mahāvrata or the great sacrificial day.

25

The days constituting the Ahīna sacrifice are declared to be the basis of sessional sacrifices. If other days are added, the same days are added (repeated) in order. To this extent they accumulate. It is these twenty-five days by which the year is measured. It is out of these days that the 360 days (of the year) originate."

Nārāyaṇa, the commentator on this Śrauta Sūtra, interprets the word 'Samvatsara,' 'year,' as the 'Cows' Walk.' The words, Prāyaṇīya, Chaturvimśa and others in the above passage are the names of both the days and the sacrifices performed thereon. Of these sacrifices some are performed after the model of the Agnishṭoma and some as Ukthyas. It is to be noticed that in this enumeration of sacrifices making up a month or twenty-five days of the 'Cows' Walk' the Shoḍaśin sacrifice is not counted.

There can be no doubt that according to Āśvalāyana twenty-five days form a unit of the 'Cows' Walk,' for he says in X, 5, 16—17 :—

यथा हि परिमिता वर्णा अपरिमितां वाची गति-
माप्नुवंति एवमेव परिमितानामह्नामपरिमितास्संधाताः ।
सिद्धानि त्वहानि तेषां यः कश्च समाहारः सिद्धमेव
शस्यम् ।

"Just as a fixed number of alphabetical letters combine to form the endless career of speech, so the groups of a fixed number of days are unlimited. Known are the days, known their group, whatever that group may be; known, therefore, is the chant (for any day)."

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Now the question is :—Are these twenty-five or thirty or even three hundred and sixty days forming the 'Cows' Walk' ordinary consecutive days, or are they some special days occurring with some definite interval? They cannot be consecutive days, inasmuch as no sacrifice is anywhere said or even implied to have been performed, nor is any enjoined to be performed on other than full or new moon days. Moreover, whether the various sacrifices pertaining to the 'Cows' Walk' of 10 or 12 months are sacrifices ordained to be performed at all times, or whether they are past performances the like of which may, on the authority of Āśvalāyana pointed out above, be repeated on the arrival of similar days, are questions which deserve consideration. By using the verb in the past tense, as 'the cows *held* a sacrificial session', the Yajurveda and the Aitareya Brāhmaṇa clearly imply that the 'Cows' Walk' of twelve months was a past performance. It follows, therefore, that these sessional sacrifices are rites performed one after another on full or new moon days at some definite interval in the past, and that when one round of all these different sacrifices was brought to a close the same series was begun again. What is that interval? If we succeed in finding out the interval between one sacrifice and another, or the interval between the appearance of successive cows, then we can solve the mystery of the Vedic calendar and recover the forgotten era or "obtain the year" as the author of the Śatapatha Brāhmaṇa would say (XII, 2, 1, 7). In order to find out this interval it is necessary to know what is precisely meant by the phrase 'Cows' Walk' and what a 'Cow' means in particular.

CHAPTER III.

Cow, the Intercalary Day.

THE word '*go*,' 'cow,' is so frequently used in the Ṛigveda that there is hardly any hymn that does not contain it. Sāyaṇa interprets the word in some cases as cow, in some others as speech, and in a number of verses as the rays of the sun, or the sun itself, or as clouds or as water. Of these various interpretations the second and the fourth may render the phrase 'Cows' Walk' somewhat intelligible. There is no difficulty in understanding the sun's walk in the sense of the year. Nor is there any difficulty in comprehending the 'Cows' Walk' or its equivalent, the walk of speech, in the sense of the year, for it has already been shown that speech or syllables of the Veda walked, *i.e.* increased as the year advanced. But none of these meanings can, as shown above, solve the riddle of the story of the 'Cows' Walk'. It is really astonishing that the one real technical sense of the word, '*go*,' on which the entire system of the Vedic calendar is based and which alone can explain a number of apparently absurd stories narrated in the Vedas, should be so entirely forgotten that one is obliged to make determined efforts to discover its original sense.

The word, '*go*,' is nothing else than a name applied to the intercalary day which, being the product of four quarter days of four consecutive solar years, was added to every fourth year, making it consist of 366 days. Manu with his band of learned priests is credited with the discovery of the annual excess of a quarter of a day over 365 days making up a solar or tropical year. This extra day is sometimes called the 'four-footed cow,' and

at other times, a mutilated child of three mothers and three fathers, the mothers and fathers being the three quarter nights and days of the three years previous to the leap year; it is also termed the fourth grade of speech, of which the three grades are considered to be the three quarter days of the previous three years. The three quarter days of three consecutive solar years in each cycle of four years are also termed the three foot-steps of Vishṇu. This may seem too bold a suggestion to accept—no less to the Indian, especially the orthodox, than to western oriental scholars. So far as the Hindus are concerned, it will prove a death-blow to the theory of the immeasurable antiquity of the Vedas, for the Vedic calendar based upon this extra day, and recorded in the Yajurveda and the Brāhmaṇas will, as will be shown later on, bring down the date of the Vedas to about 3101 B.C. Western scholars, on the other hand, will find it hard to think that the Hindus of so early a period as 3101 B.C. were able to discover what, to western nations, appeared a knotty problem to solve until a recent period. Nevertheless, we believe that such was the case. A large portion of the Vedas is devoted to the description of this extra day. The following are some of the verses which can only apply to the extra day:—

"The night and the day mutually effacing each other's complexion give nourishment, combined together to one infant, who radiant shines between earth and heaven: the gods retain Agni as the giver of sacrificial wealth."[1] Ṛigveda I, 96, 5.

Before going on to consider other passages referring to to this extra day, it is necessary to clearly understand what is meant by the phrase 'the night and the day mutually effacing' in the above verse: to the Vedic

[1] The quotations from the *Rigveda* are all as translated by H. H. Wilson, and those from the *Atharvaveda* as translated by Prof. Whitney.

Āryas, the day commenced and ended with the evening.[1] Accordingly, the first year after the fourth year of any cycle would commence in the evening and close at midnight after the lapse of 365¼ days; the second year would commence at midnight and close in the morning of the 366th day; the third year would begin in the morning and end at the midday of the 366th day; and the fourth year, beginning at midday, would come to a close on the usual evening of the 366th day. The first is called Kali or Ekata; the second year Dvāpara or Dvita; the third year Treta or Trita; and the fourth year Kṛita (complete), Satya, or Ṛita, truth, *i.e.* that which has come into existence. Of this purport is the following famous verse from the Aitareya Brāhmaṇa (Book VII, 15; P. 464, Haug's translation.)

कलिश्शयानो भवति संजिहानस्तु द्वापरः । उत्ति-
ष्ठन् त्रेता भवति चरन्संपद्यते कृतम् ॥

"The year Kali is lying down; Dvāpara is leaving (the bed); standing erect is Treta; and Kṛita happens to walk here and there."

As each of the succeeding years of every cycle of four years advances a quarter of a day more and steps beyond the night or day limits of its predecessor before bringing out a complete day, personified as a child here, the poet speaks of the last nights and days of the three years previous to the fourth as 'mutually effacing each other and bringing forth a child.'

"The sole (sun) having three mothers and three fathers stood on high. The twelve-spoked wheel of the true sun revolves round the heavens and never tends to decay. Seven hundred and twenty children in pairs, Agni, abide in it." R. V. I, 164, 10-11.

Here the one sole sun is clearly the extra day and its three mothers and fathers are the three last nights and

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[1] See Haug's translation of *Aitareya Brahmana*, Book VIII, 15 P. 520.

days of the three years previous to the fourth year. The twelve spokes are the twelve months of 30 days each. The 720 children are the three hundred and sixty days and the three hundred and sixty nights in the year. It is to be noticed here how it is usual with the poet to talk of days as male children and nights as female children. As the Vedic poets kept apart 21 days in each cycle of four years, the poet restricts the number of days in the year to 360.

"In the syllable of the verse is the highest firmament on which all the gods sat down. He who knoweth not that, what will he do with the verse? They who know that sit together yonder." R. V. I, 164, 39; A. V. IX, 10, 17.

"Shaping with measure the step of the verse, they shaped by the half verse all that stirs; the Brāhman of three feet, many-formed, spread-out, by that do the four quarters live." A. V. IX, 10, 18.

"Mayest thou be well portioned, feeding on excellent meadows; so also may we be well portioned; eat thou grass, O inviolable one, at all times; drink clear water moving hither." A V. IX, 10, 19.

"The cow verily lowed, fashioning the seas; one-footed; two-footed is she, four-footed; having become eight-footed, thousand-syllabled, a series of existence; out from her flow apart the oceans." R. V. I, 164, 42; A. V. IX, 10, 21.

"Speech has four measured-out quarters; those are known by Brāhmans who are skilful; three deposited in secret, they do not set in motion; a fourth of speech human beings speak." R. V. I, 164, 45; A. V. IX, 10, 27.

"They call him Indra, Mitra, Varuṇa, Agni; likewise he is the heavenly-winged eagle; what is one, the sages name variously; they call him Agni, Yama, Mātariśvan." R. V. I, 164, 46; A. V. IX, 10, 28.

As the Vedic poets used the syllable to count the days made by the sun and the moon, the firmament—which is the abode of the sacrificial gods, the sun and the moon—is spoken of in the first verse as being in the syllable.

The Brāhman of three feet referred to in the second verse is the three-quarter day of the third year. The same intercalary day is personified as a heavenly cow in the fourth verse. 'Eight-footed cow' in the fourth verse refers to the eight years in the series. The seas and oceans appear to be days described as such. The fifth verse (in the order of quotation) refers to the four quarter days at the end of four consecutive solar years and to the impossibility of representing the first three quarter days by quarter syllables which are inexpressible. It is only the complete syllable which man can utter and thereby represent the complete extra day resulting from the four quarter days of the four years. This intercalary day is called by many names, such as those enumerated in the verse; and one of its names is the heavenly eagle which plays an important part in the so-called Soma myth of the Vedas.

In the following verse from the Atharvaveda, the intercalary day is identified with Speech personified as a bird:—

"Propitious to thee are some; unpropitious to thee are some; all thou bearest with well-willing mind. Three voices are deposited within; of these one flew away after sound." A. V. VII, 43.

This verse is addressed to Speech; 'the three voices' are the same as the three grades of speech referred to in the other verse quoted above. That which is spoken of as flying after becoming a complete sound, like the mutilated child which developes as alluded to in another passage, is nothing but the intercalary day which like other

whole days deserves representation by a complete syllable and flies away like them.

The Soma myth which has been taxing the brain of many oriental scholars can be satisfactorily explained on the theory of the intercalary day. The myth is thus narrated in the Aitareya Brāhmaṇa (Book III, Chapter 3, Section 25) :—

" The king Soma lived (once) in the other world (in heaven). The Gods and Ṛishis deliberated : 'how might the king Soma be induced to come to us ?' They said, 'Ye metres must bring back to us this king Soma.' They consented. They transformed themselves into birds. That they transformed themselves into birds (suparṇa) and flew up, is called by the knowers of stories Sauparṇam (*i.e.* this very story is called so). The metres went to fetch the king Soma. They consisted at that time of four syllables only; for at that time there were only such metres as consisted of four syllables only. The Jagatī with her four syllables first flew up. In flying up she became tired; after having completed only half the way, she lost three syllables; and being reduced to one syllable, she took from heaven with her only the Dīkshā and Tapas; and flew back to the earth. He who has cattle is possessed of Dīkshā and possessed of Tapas. For cattle belong to Jagatī and Jagatī took them. Then the Trishṭubh flew up. After having completed more than half the way, she became fatigued, and throwing off one syllable, became reduced to three syllables, and taking with her the Dakshiṇa flew back to the earth. Thence the Dakshiṇa gifts (sacrificial rewards) are carried away by the priests at the midday libation which is the place of the Trishṭubh; for Trishṭubh alone had taken them (the Dakshiṇa gifts). The gods said to the Gāyatrī, 'Fetch thou the king Soma.' She consented, but said, 'During the whole of my journey (up to the celestial world) you must repeat the formula for wishing a safe passage for me.' The gods consented. She flew up.

The Gāyatrī, when flying up, frightened the guardians of Soma, and seized him with her feet and bill and (along with him) she also seized the syllables which the two other metres had lost. Kriśanu, one of the guardians of Soma, discharged an arrow after her, which cut off the nail of her left leg."

The pith of the story seems to be that on one occasion the moon happened to be in a region far away from the place which he ought to have occupied according to the expectation of the poets on the day of intended sacrifice, as calculated by the syllables of the verses in the Jagatī and the Trishṭubh metres and the animal signs denoting weeks or months, and that the moon took as many days as the syllables of the Gāyatrī metre, less by a fraction represented by the nail. This delay on the part of the moon seems to have been ascribed not to miscalculation in determining the period of a lunation, but to some mysterious power which certain heavenly beings called Gandharvas possessed not only over the moon, but also on the sun.

The Gandharvas with their spouses, the Apsaras, are described in the Atharvaveda as the guardians of the three quarters deposited in secret:—

"May the Gandharva, knowing of the immortal, proclaim that highest abode that is in secret; three quarters (Pāda) of it are deposited in secret. Whoso knoweth them shall be the father's father." A. V. II, 1.

" They that are noisy, dusky, dice-loving, mind-confusing—to those Apsaras that have the Gandharvas for spouses, have I paid homage." A. V. II, 2.

The connection of the Gandharvas with dice-play in which the winning numbers are four, three, two, or one should be noted here. To these four numbers are, as will be seen, applied the names of the four Yugas—Kṛita, Treta, Dvāpara, and Kali in order.

The connection of the cow with the three abode *i.e.* the three quarter days, is thus described in the Atha vaveda :—

"The draft-ox[1] sustains the earth and sky; th draft-ox sustains the wide atmosphere; the draft-o sustains the six wide directions: the draft-ox hath entere into all existence.

"The draft-ox is Indra; he looks for the cattle; *tri ways* the mighty one measures out: yielding the pa the future, existing things, he goes upon all the courses the gods.

"He (the draft-ox) milks (duh = produces) in th evening; he milks in the morning; he milks about mid day; the milkings of him that come together, tho unfailing ones we know." A. V. IV, II.

The earth, sky, and atmosphere referred to in th first verse are, as will also be seen later on, the names the three quarter days, or of the first three years of eac cycle of four years. The six wide directions are the las six days of the fourth year. The bull in the second vers is identified with Indra, which, as already seen, is one o the many names of the deified extra day. It should b particularly noted how the description of the bull, a measuring the past, the present, and the future, and a productive of three separate milkings in the evening morning, and midday in addition to a combined milking will be intelligible only when the passage is taken a referring to the three quarter days and the extra day The use of the word 'milking' in the sense of intercalatio in the Yajurvedic passages (VII, 5, 3 and 6) about th discussion of making intercalation or no intercalation ha already been clearly pointed out. The Vedic poets kep as will be seen, their era, not in terms of ordinary year as we now do, but in terms of these intercalary days a

[1] The word '*go*' in Sanskrit means both the cow and the bull.

one cow, two cows, three cows, and so on, each cow being equal to a cycle of four years. Hence the description of the cow or bull as measuring the past, the present, and the future is no exaggeration, and it is ignorance of the conventional meaning of the vedic poets that has led Prof. Whitney to take the above hymn as "an example of that characteristic Hindu exaggeration without any measure or limit, of the immediate object of reverence," as if the immediate object of reverence in the hymn was an actual bull, and as if the poet was so devoid of the sense of rhyme and reason as to attribute to the actual bull an unimaginable capacity to measure time.

Also, "The seed of the cow was quartered; the waters a quarter, the amṛita (nectar) a quarter, the sacrifice a quarter, the domestic animals a quarter."

"The cow is the sky, the cow the earth; the cow Vishṇu, Prajāpati; the yield of the cow did the Perfectibles and the Vasus drink." A. V. X, 10.

"Three settings, dawnings also three; three welkins, skies verily three; we know, O Agni, the birth-place of the three-fold; three-fold the birth-place of the gods we know."

"The one-footed strode out more than the two-footed; the two-footed falls on the three-footed from behind; the four-footed acted within the call of the two-footed ones, beholding the series drawing near." A. V. XIII, 3.

Here the division of the cow's seed into four parts, to each of which a special name is given, as well as the stride of the one-footed, two-footed, three-footed and the four-footed, are plain references to the four quarter days of the four years of any cycle.

The occurrence of the intercalary days one after another is thus described in the Ṛigveda and also in the Atharvaveda :—

"Indra, the common object of worship, thou art praised by many sacrificing Ṛishis; for it is thou, the destroyer of foes, who thus givest cows, *one by one* to thy worshippers." R. V. VIII, 70, 14.

"What three great ones there are, the fourth of which one disjoins as speech—the priest may know it by penance, the inspired one, *in which one is joined*, *in which one is joined*." A. V. VIII, 9, 3.

The fact of composing new verses and singing them on the intercalary day is what is hinted at in the following verses:—

"The divine cow who herself utters speech and gives speech to others, who comes attended by every kind of utterance, who helps me for my worship of the gods,—it is only the fool who abandons her." R. V. VIII, 101, 16.

"The foot-less dawn[1] Indra and Agni, comes before the footed sleepers, animating the head of living beings with consciousness, causing them to utter loud sounds with their tongues, and passing onwards, she traverses thirty steps (30 Muhūrtas, the divisions of the day and and night)." R. V. VI, 59, 6.

The Black Yajurveda contains a passage which is recited while setting up the sacred fire for a second time and in which the foot-less dawn of the above verse is described as a cow:—

आयं गौः पृश्निरक्रमीदसन्मातरं पुनः । पितरं च
प्रयन्सुवः । त्रिंशद्धाम विराजति वाक्पतंगाय शिश्रिये ॥

I, 5, 3, 10.

"This white cow has stepped forward, and having joined her mother and father again, has become calm; the day of thirty divisions shines, and speech has clung unto the day for the sake of the bird (the sun or the intercalary day)."

[1] Compare R. V. I, 152, 2-3, where the foot-less dawn is said to be the precursor of footed ones.

The poet takes full advantage of the name, cow, given to the extra day and applies to it all the characteristics of a bull as in the following verse :—

"We glorify Pūshan, the husband of his mother; may the gallant of his sister hear us; may the brother of Indra be our friend." R. V. VI, 55, 4.

"May Pūshan bestow upon us cows with golden horns." R. V. VI, 49, 8.

Consistently with the metaphor of calling the day a cow and in keeping with the usual practice of describing the three quarter nights and days sometimes as mothers and fathers of the extra day, and at other times as the wives of the same, the poet applies to the day the characteristic action of a bull marrying its own mother or sister. The word 'Pūshan,' means that which has developed and is usually applied as a name to the extra day.

As the number of intercalary days increases, the body of Indra who is identified with them must also increase. This idea is plainly expressed in the following verse :—

"May the person of that vast Indra, celebrated by praises and prayers, ever increase; Indra whom neither years nor months make old, nor days enfeeble." R. V. VI, 24, 7.

In the following verses, Indra is identified with the cow, the intercalary day, the three quarters of which are elsewhere said to be hidden in a cave or secret :—

"May the cows be (for our) affluence: may Indra grant me cattle: may the cows yield the food of the first libation; these cows, O men, are Indra, Indra whom I desire with heart and soul." R. V. VI, 28, 5.

"In this world our mortal fore-fathers departed after instituting the dawn, they extricated the milk-yielding

kine, concealed among the rocks in the darkness of th
cave." R. V. IV, 1, 13.

The word '*guhā*,' 'cave,' which is translated a
'secret' by both Prof. Whitney and Prof. Wilson in A. V
IX, 10, 27 and R. V. I, 164, 45 must necessarily mea
the same 'secret' here also, in which the three quarte
days are said to be hidden.

The dawn, *i.e.* the intercalary day, is in the followin
verses connected with the Satya, which is another nam
of the so-called Kṛita Yuga :—

"The showerer of water, urging on the dawn, at th
root of the truthful day (satyasya) hath pervaded the vas
heaven and earth." R. V. III, 61, 7.

"Ushas, (dawn) who spreadest over all the region
thou abidest on high, the ensign of the immortal su
purposing to travel the same road, repeatedly turn bac
ever new revolving like a wheel."

"One stationary year sustains six burthens; th
solar rays spread through that true and extensive term
Three revolving spheres are severally above and ar
placed in secret and one is visible. The three-breaste
the showerer of rain, the omniform, the three-uddere
the parent of multiform progeny, the possesser of magni
tude, followed by three hosts, the year advances, th
vigorous impregnator of the perpetual plants." R. V
III, 56, 2.

The '*revolving wheel*' in the second verse is n
other than the recurring cycle of four years. Th
'*stationary year*' in the third verse is the fourth yea
and the three revolving spheres are the three year
previous to the fourth. The six burthens are the last si
days of the fourth year. The three breasts and the thr
udders are the three quarter-days.

Like the dawn, Indra is also said to be revolvin
like a wheel in the following verse :—

"(Induced) by praises of men, return Indra like a revolving wheel to us, dependent upon thy favour." R. V. IV, 31, 4.

It is therefore clear that Indra is the intercalary day like the 'dawn.' Indra, the intercalary day, returns by praises, *i.e.* as calculated by the syllables of the verses composed corresponding to the number of elapsed days. This power of speech is made clear in the following verses :—

"May Agni, filling both (the middling and most excellent condition), bright shining, of manifold vigour, the showerer of benefits, the possessor of affluence, who comprehends by his wisdom the *mysterious sacred hymn as they track the footsteps of a cow*, reveal (sense) to me." R. V. IV, 5, 3.

"Men are not satisfied by unproductive, frivolous, inconclusive, scanty speech; then what, Agni, do they here say to thee? devoid of *implements* (of worship), let them suffer from distress." R. V. IV, 5, 14,

Atharvan, a priest, associated with the Angirases and Manu, elsewhere in the Ṛigveda, is credited with the discovery of the intercalary day in the following verse :—

"Atharvan first by sacrifices discovered the path of the stolen cattle: then the bright sun, the cherisher of pious acts, was born." R. V. I, 83, 5.

Here the sacrifices are the periodical sacrifices which enabled the priest to find out the true length of the tropical year. The stolen cattle are the missed intercalary days. The bright sun is the intercalary day on which pious acts were performed.

The following are some of the passages in which the intercalary day is described as a child of many mothers and many fathers :—

"The child of two mothers sleeps in the west, but in the morning the single infant proceeds unobstructed

(through the sky): these are the functions of Mitra an Varuṇa: great and unequalled is the might of the gods." R. V. III, 55, 6.

"The child of two mothers, the invoker of the god at sacrifices, the universal sovereign, proceeds then forward (in the sky); the root (of all), he abides (in th houses of the pious): the reciters of pleasant (words) off him agreeable praises: great and unequalled is the migh of the gods." III, 55, 11.

"The twin pair (day and night) adopt various forms one of them shines brightly, the other is black: twi sisters are they, one black and the other white: great an unequalled is the might of the gods." III, 55, 11.

"Where the mother and the daughter, two produ tive milch-kine unite, they nourish each other: I worsh them both in the firmament, the dwelling of the water great and unequalled is the might of the gods." II 55, 12.

"The young mother cherishes her mutilated boy i secret, and gives him not up to the father: men behol not his mutilated form, but (see him) when placed befo (them) in an unresting (position)." R. V. V, 2, 1.

"Young mother, what boy is this whom thou, a malevolent spirit, fosterest? the mighty queen has give him birth; the embryo has thriven through many years I have seen him born as the mother brought him forth R. V. V, 2, 2.

"I have seen him from a near place, golden-toothe bright-coloured, wielding flames like weapons when offerin to him the ambrosial all-diffusing oblation: what ca those who acknowledge not Indra, who repeat not h praise do unto me?"

"I have seen him passing securely from place place, like a herd of cattle, shining brightly of his ow

[1] This and the other passages following are as translated H. H. Wilson.

accord: they apprehend not those flames of his, but he has again been born, and they which had become grey-haired are once more young." R. V. V, 2, 3-4.

The mutilated boy of many mothers identified with Indra and Agni in these and other passages cannot possibly be other than the intercalary day. The story, narrated by Sāyaṇa in his commentary on the above passage, of a Brāhman boy killed by the chariot of king Tryaruṇa and brought to life again by Vṛisha, the king's family priest, is apparently a later legend based upon the astronomical fact of four quarter days of four tropical years forming an extra day. It is probable that, as a number of poets had to sing in honour of this extra day as often as it recurred, they thought it uncouth to keep up the same metaphor in their description of this cyclic day and they had recourse to as much variety of expression as their language could afford and their imagination could invent.

Also there is in the fourth Kāṇḍa of the Kṛishṇa Yajurveda a passage which, when read in the light thrown upon it by the commentary contained in V, 1, 10 of the same Veda, not only clears away the doubt, if there is any, about the Vedic poet's personification of the intercalary day as a child, but also provides us with the details of the ceremonial which the Vedic poets symbolically observed on that day. The passage runs as follows:—

दृशानो रुक्म उर्व्या व्यद्यौद्दुर्मर्षमायुःश्रिये रुचानः । अग्निरमृतो अभवद्वयोभिर्यदेनं द्यौरजनयत्सुरेताः । विश्वा रूपाणि प्रतिमुंचते कविः प्रासावद्भिद्रं द्विपदे चतुष्पदे । विनाकमख्यत्सविता वरेण्योऽनुप्रयाणमुषसो विराजति । नक्तोषसा समनसा विरूपे धापयेते शिशुमेकं समीची । द्यावा क्षामा रुक्मः । अंतार्विभाति देवा अग्निं धारयन् द्रविणोदाः । सुपर्णोऽसि गारुत्मान् ॥ IV, 1, 10.

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"This golden necklace of pleasing appearance shines with great splendour, desirous to lengthen the life which does not deserve negligence. That Agni, whom the fertile sky brought forth, has become immortal with age. The omniscient and worshipful (sun) takes upon himself all forms and has brought happiness both to the biped and the quadruped. The worshipful sun has clearly revealed the heaven and shines splendidly following the dawn. The night and the day, of different complexion but of single purpose, conduct that one child. The golden necklace shines between heaven and earth; the wealth bestowing gods have taken possession of Agni. Agni, thou art the well-winged eagle."[1]

The commentary[2] contained in the fifth Kāṇḍa on this passage directs the sacrificer to recite these passages and put on a golden necklace containing at one end a piece of antelope's skin and, at the other, a rectangular piece of gold with twenty-one points carved on its surface. It is this golden necklace that is addressed as the symbolical fire and eagle. The twenty-one points on the golden piece seem to represent the twenty-one days, which are the difference between four civil years of 360 days each and four tropical years of $365\frac{1}{4}$ days each. This necklace is termed the 'noose' of Varuṇa, which the sacrificer has to bear on his neck till he has got rid of the accumulated intercalary days. The child conducted by the night and the day can be no other than the extra day, the golden day at the close of which the necklace is removed. The heaven which the sun is said to have revealed seems to be the winter solstice which in the Vedānga Jyotisha is termed 'Svaḥ,' 'heaven.'

Thus it is clear that the 'three mothers of the child or dawn,' the 'three grades of speech,' and the 'three

[1] Compare Griffith's Translation of the *White Yajurveda*, Book XII, verses 1—4.

[2] See also Griffith's note 1, p. 100, Translation of the *White Yajurveda*.

quarters of the seed of a cow' are different Vedic expressions signifying the three quarter days of three consecutive tropical years making in the fourth year 'a child,' 'a syllable,' and 'a cow.' Likewise the three strides or footprints of Vishṇu can be no other than the same three quarter days, Vishṇu himself being the extra day.

The three strides of Vishṇu are thus described in the Ṛigveda :—

"Earnestly I glorify the exploits of Vishṇu, who made the three worlds, who sustained the lofty aggregate site (of the spheres); thrice traversing (the whole); who is praised by the exalted."

"Vishṇu is therefore glorified, because that by his prowess he is like a fearful, ravenous, and mountain-haunting wild beast, and because that in his three paces all worlds abide."

"May acceptable vigour attend Vishṇu, who abides in prayer, the hymned of many, the showerer (of benefits), who alone made, by three steps, this spacious and durable aggregate (of the three worlds)."

"Whose three imperishable paces, filled with ambrosia, delight (man-kind) with sacred food; who verily alone upholds the three elements, and earth and heaven."

"May I attain his favourite path, in which god-seeking men delight; the path of that wide-stepping Vishṇu, in whose exalted station there is a perpetual flow of felicity; for to such a degree is he the friend (of the pious). We pray to Vishṇu that you may both go to those regions where the many-pointed and wide-spreading rays of light expand; for here the supreme station of the many-hymned, the showerer of benefits, shines with great splendour." R. V. I, 154.

The Kṛishna Yajurveda connects Vishṇu with Indra and describes the highest place of Vishṇu as the seat of the 'cows':—

ते ते धामानुश्मसि । गमध्ये गावो यत्र भूरिशृंगा अयासः । अत्राह तदुरुगायस्य विष्णोः परमं पदमवभाति भूरेः । विष्णोः कर्माणि पश्यत यतो व्रतानि पम्पशे इंद्रस्य युज्यस्सखा तद्विष्णोः परमं पद सद पश्यंति सूरयः दिवीव चक्षुराततम् ॥ I, 3, 6.

"The sacrificer desires to attain thy places whe *cows with many horns are wandering.* In these ver places shines the highest seat of that mighty and muc praised Vishṇu. Behold ye, the deeds of Vishṇu, fro where he, the constant friend of Indra, beholds yo rites. That highest seat of Vishṇu the learned ever be hold like an eye stretched on the sky."

Taking the word '*go*' in the sense of 'ray', Pro Wilson has translated the phrase 'bhūrisṛingā gāvaḥ as 'many-pointed rays' in the Ṛigvedic passage quot above. It is immaterial whether we take that word the sense of 'cow,' 'ray' or 'water,' provided understand it at the same time to be a conventional ter signifying a day, *i.e.* the intercalary day. As the inte calary day is deified as Vishṇu, the latter's body, ma up of those recurring days, must necessarily increas cycle after cycle, as stated in the following verse fro the Atharvaveda:—

"O Agni and Vishṇu, great is your dear doma (*dhāman* = seat); ye partake of the ghee, enjoying secr things, increasing by good praise in each house; ma your tongue move up to meet the ghee." A. V. VII, 2

The Mexicans, whose calendar is said to be simila to that of the Hindus, are stated in the *Encyclopædi Britannica* (p. 794—5, Vol. XXIV) to have been familia with the idea of the three foot-prints of Vishṇu making day:—

"The Aztec calendar includes Nakshatra title borrowed not only through the medium of the Tarta

zodiac, but likewise from the Indian scheme apart from any known intervention. The three foot-prints of Vishṇu, for example, unmistakably gave its name to the Mexican day 'Ollin,' signifying the track of the sun; and both series further contain a 'flint weapon,' a 'stick', a 'house'. Several houses and couches were ranged along the Hindu zodiac with the naive idea of providing resting places for the wandering moon."

When such is the overwhelming evidence coming from a distant nation, there is no reason to doubt that in these and other passages, too numerous to quote here, the poets alluded to the intercalary day and to that day alone. It is true that Sāyaṇa takes none of the above verses, nor any other verse of the Vedas as referring to the intercalary day, but sees only Vedāntic mystery in them. In his translation of the Atharvaveda, Prof. Whitney styles many of these passages as 'mystic', and, dissatisfied with Sāyaṇa's explanation, writes in his note under A. V. II, 1. 1 as follows:—

"A bit of laboured obscurity, like the verses that follow; Books IV. and V. begin similarly; no attempt will be made here to solve the riddles. The commentator explains at great length (nine quarto pages), but evidently without any traditional or other understanding; he guesses and etymologizes this way and that, giving in part wholly discordant alternative interpretations."

The solution of the riddle which Prof. Whitney, who combined in himself the knowledge of both Astronomy and Sanskrit literature, would certainly have attempted, had he not, unfortunately for the cause of Vedic learning, prematurely died, is, I believe, the poet's allusion to the intercalary day, as I have pointed out at length. If there is any doubt still left, the perusal of the next few chapters will, I trust, help to remove it.

CHAPTER IV.

The Test of the Intercalary Day.

It is the moon that has even now been taken as th measurer of the month. The Vedic period was no excep tion to this rule. The lunar year of the Vedic poet commenced and ended with the full moon, one of th names of which is Pūrṇamāsa or complete month. Now four tropical years of $365\frac{1}{4}$ days each consist of 49 lunations of $29\frac{1}{2}$ days each and a remainder of $15\frac{1}{2}$ days so that the fifteenth day after 49 full moons happens t be a new moon day; and the second cycle of four year would consist of 99 lunations and a remainder of abou a day and a half, and end with a full moon on the las but one day. This phenomenon of the full moon followin the new moon and *vice versa* would recur cycle afte cycle, subject, of course, to necessary corrections due t irregular variation in the motion of the moon. Th occurrence of the new moon on an intercalary day is thu described in the Atharvaveda:—

"The night hath come, assembler of good thing causing sustenance, prosperity, and good to enter in; w would worship Amāvāsyā with oblation; yielding (duh sustenance with milk is she come to us."[1] A. V. VII, 84, 3

The description of an intercalary day, as a cow yield ing morning, midday and evening milkings, apart from a combined milking, has already been mentioned. As here also the new moon is described as a cow yielding susten ance with milk, the occurrence of the new moon on an intercalary day must necessarily have been meant.

[1] Compare *Taitt. S. III, 5, 1.*

The occurrence of full moon on an intercalary day is also thus described in the Atharvaveda :—

"We sacrifice to the vigorous bull of the full moon; let him give us unexhausted unfailing wealth. A. V. VII, 85 (80), 2.

The personification of the full moon as a bull or draft-ox identified elsewhere with the intercalary day, leaves no doubt that the occurrence of full moon on an intercalary day is meant here.

The interval between any two lunations is not, however, exactly of 29½ days, but is found to vary in length from about 29¼ days to 29¾ days, its average length being about 29 days, 12 hours and 44 minutes. Whether we take the lunar month to be of 29½ days as the Vedic poets seem[1] to have done, or whether we take it to consist of 29 days, 12 hours and 44 minutes, we cannot in any case expect to have full or new moon exactly on the last day of the fourth year of every cycle. Full moon falling once on the last day, the intercalary day, it would go further and further, till, gaining about fifteen days, its reverse phenomenon, *i.e.* new moon in place of full moon, and again *vice versa*, would occur on the intercalary day. The Vedic poets seem to have been aware of this kind of variation in the motion of the moon, and therefore, called her 'Vṛika', wolf.

Owing to the error of over-calculating about 12 minutes in each solar year and of under-calculating about 8 or 9 hours in each lunar year, the difference between the calculated and the observed new moon on one occasion seems to have amounted to seven or eight days; one of the Ṛigvedic poets, Dīrghatamas by name, seems to have actually observed the mistake, and relying upon the accuracy of his own calculation as taught to him by his forefathers, to have gone so far as to charge

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[1] See *Lāṭyāyana's Srauta Sūtra*, IV, 8, 6, where a lunar year is said to be less than a civil year by six days.

the gods themselves with breach of law. The hymn in which this complaint is made runs as follows:—

1. "The graceful moving moon (Chandramā Suparṇaḥ) speeds along the middle region in the sky bright golden rays behold not your abiding place. Heaven and earth, be conscious of this (my affliction).

2. "Those who seek for wealth, obtain it; a wife enjoys (the presence of) her husband, and from their union progeny is engendered. Heaven and earth, be conscious of this (my affliction).

3. "Never, gods, may this, abiding above in heaven be excluded (from it); never may we be in want of a son), the cause of joy, entitled to libations of the Soma juice. Heaven and earth, be conscious of this (my affliction).

4. "I implore the first (of the gods), the object of sacrifice, that he will become my messenger, and narrate (my condition to the other deities). Where, Agni, is thy former benevolence (ṛitam = truth), what new being possesses it? Heaven and earth, be conscious of this (my affliction).

5. "Gods, who are present in three worlds, who abide in the light of the sun, where is your truth (ṛitam) where your untruth (anṛitam), where the ancient invocation addressed to you? Heaven and earth, be conscious of this (my affliction).

6. "Where, deities, is your observance of the truth (ṛitam), where the (benignant) regard of Varuṇa, where is the path of the mighty Aryaman? Heaven and earth, be conscious of this (my affliction).

7. "I am he, gods, who formerly recited (your praise) when the libation was poured out; yet sorrows assail me like a wolf (that falls upon a thirsty deer). Heaven and earth, be conscious of this (my affliction).

8. "The ribs (of the well close) round me, like the rival wives (of one husband); cares consume me, Śatakratu, although thy worshipper, as a rat (gnaws a weaver's) threads. Heaven and earth, be conscious of this (my affliction).

9. "Those which are the seven rays (of the sun), in them is my navel expanded; Trita, the son of waters knows (that it is so), and he praises them for his extrication (from the well). Heaven and earth, be conscious of this (my affliction).

10. "May the five shedders (of benefits) who abide in the centre of the expanded heavens, having together conveyed my prayers quickly to the gods (speedily) return. Heaven and earth, be conscious of this (my affliction).

11. "The rays of the sun abide in the surrounding centre of heaven; they drive back the moon (Vṛika = wolf), crossing the great waters from the path. Heaven and earth, be conscious of this (my affliction).

12. "That new praiseworthy and commended (vigour) is seated in you, ye gods, (by which) the rivers urge on the waters and the sun diffuses his constant (light). Heaven and earth, be conscious of this (my affliction).

13. "Worthy of praise, Agni, is that thy relationship (with the gods); do thou, who art most wise, seated at our (solemnity), worship (the gods) as (at the sacrifice of) Manu. Heaven and earth, be conscious of this (my affliction).

14. "May that wise and liberal Agni, a sage, amongst the gods, seated at our rite, as at the sacrifice of Manu, be the invoker of the deities and offer them libations. Heaven and earth, be conscious of this (my affliction).

15. "Varuṇa performs the rite of preservation; we devise him as the guide of our way; (to him the repeater of praise) addresses praise with his whole heart; may he

who is entitled to laudation become our true suppor Heaven and earth, be conscious of this (my affliction).

16. "The sun who has avowedly made the path i heaven, is not to be disregarded, gods, by you; but yo mortals, regard him not. Heaven and earth, be consciou of this (my affliction).

17. "Trita fallen into the well invokes the gods f succour. Bṛihaspati who liberates many from sin, hear (the supplication). Heaven and earth, be conscious this, my supplication.

"He, the moon, the month-maker, it is said, havi thought of the constellations going along the path of t sky, became united with one of them, paying therefor no attention to Trita in the well.

"By this recitation may we, becoming possessed Indra, and strong with multiplied progeny, overcome o foes in battle; and may Mitra, Varuṇa, Aditi, ocea earth, and heaven, be gracious to us in this (request)."

The cause of this serious complaint of the po Dīrghatamas, is evidently the failure of the expect occurrence of the new moon at the close of the Ṛita Satya, *i.e.*, the Kṛita, the fourth year of a cycle. The mo is in the centre of the sky instead of being, as expected b the poet, at the horizon so as to be covered by the gold rays of the rising sun. (2) As usual, the poet expecte the union of the sun and the moon who are believed t represent a wife and her husband. (3) In the absence that union of the sun and the moon, the birth of th child of three mothers and three fathers, *i.e.* the inte calary day on which libations of Soma juice are offere with much joy, is impossible. (4) Again, the intercalar day is gone out of Satya, the fourth year. (5) Th tutelary gods of the three worlds, the previous three year appear also to have left the places assigned to them. Th calculation made with the syllables of ancient prayers s

long accumulated is wide of the truth. (6) The connection between the Ṛita and its tutelary deities seems to be severed. (7) The poet's calculation once held good; but now it seems to be wrong, and he feels distressed. (8) He feels distressed at the break of the sacrificial thread, as if it were gnawed by a rat. (9, 17, 18) When Trita, the third year, sank under water, *i.e.* closed, the wolfish moon was just as high as the poet's navel, from the eastern horizon and seemed nearly falling upon Trita under water. It is to be noted here that the difference of 33 days between three solar and lunar years with the addition of 7 or 8 missing days due to miscalculation would amount to about 41 days at the end of the third year of a cycle with the moon about 30° high from the eastern horizon in the morning. (11) But now at the close of the fourth year, the sun's rays seem to drive back the moon instead of attracting it as on the new moon day. (13—14) So the intercalary day does not seem to recur now as it did at the sacrifice performed by Manu. (16) It is not proper to disregard the sun and follow the moon alone as some, says the poet, are doing.

This seems to be the sum and substance of the above hymn and it has been found impossible to assign any other connected meaning to it. As to Sāyaṇa's version of the story of Trita, whom his two elder brothers, Ekata and Dvita, are said to have thrown into a well from which he is said to have supplied them with water to quench their thirst, it seems to have been based upon the astronomical fact of the occurrence of new moon almost at the close of the third year of a cycle of four years. The words, Ekata, Dvita, and Trita, which mean the state of one, the state of two, and the state of three, seem to be the appellations devised by the Vedic poets to signify the nature of the lunar phenomenon at the close of the first, second, and third years of every cycle of four years. Thus when the wolfish moon began to be uncertain in its movements and the expected phenomenon of new or full

moon failed to mark the close of the cycle, the poets seen to have begun to follow the sun, *i. e.* the solar year, a implied by the sixteenth verse of the above hymn; and whenever they expected new moon to occur on any of th twelve days subsequent to the second day of the firs year of a new cycle, they seem to have begun thei sacrificial performance on the previous full moon day an continued it till the close of the fourth solar year of th previous cycle. Thus if the new moon were to occur o the third day of the first year of the next cycle, thei sacrificial performance would begin on the previous ne moon day and continue for twelve days till the close c the solar year of the previous cycle; if on the fourth day it would begin likewise on the previous full moon day eleven days earlier than the close of the previous cycle if on the fifth day, it would begin 10 days earlier; if o the sixth day, it would commence 9 days earlier; if on th seventh day, it would begin 8 days before the close c the cycle; and if the new moon were to occur on th fourteenth day of the first year of the next cycle, thei sacrifice would begin and close on the last day of th previous cycle. Of these several sacrificial periods, tho which occupy not less than two days and not more tha twelve days, are termed Ahīna sacrifices.

There is no Brāhmaṇa work nor a Śrauta Sūtr which omits to refer to the Ahīna sacrifice. The Aita eya Brāhmaṇa (VI, 18) takes the word 'Ahīna' to mea 'not defective,' while in other works it is explained a 'pertaining to days'. Apastamba defines it as follows :-

यत्पूर्वास्मिन्नहन्युत्तरस्मा अह्ने क्रियते ता अहीनंसततयः ॥

XXI, 13, 3.

"Those days during which the subsequent day' rite is performed on the previous day are the assemblag of Ahīna days. XXI, 13, 3.

Drāhyāyana is more explicit and says :—

पौर्णमासदीक्षा मासापवर्गा अहीनाः । तेषां द्वादशोप-

सदः । षडिति धानंजप्यः । सुत्याभ्युच्चये दीक्षाप्रतिह्रासः । एकात्रिंशेऽहनि यज्ञपुच्छं त्रिंशे वा । सर्वेऽतिरात्रा अहीना द्विरात्रप्रभृतयश्चाहर्गणाः ॥ IX. 5.

"Those days of which the day of initiatory rite begins on the full moon day and which complete the month are the Ahīnas. The number of days which constitute them are twelve, termed as 'siege' (*upasad*) days. They are six according to Dhānanjapya. The tail of the sacrifice (*i.e.* the remaining days' rite after the chief sacrificial day is over) is observed on the thirty-first or thirtieth day. If the days on which the Soma plant is pressed are increased, the number of days of the initiatory rite are proportionately lessened. All Atirātra days, over and above two days and upwards, are termed Ahīna days." Drāhyāyana Śr. Sū. IX, 5.

What Drāhyāyana means is this:—Of the Ahīna period of 12 days, about three or four days are occupied in performing the initiatory rite, and during the remaining days Soma pressing is commenced and continued till the civil month (the last month of the civil year) is completed on the thirty first or the thirtieth day. The period of the Ahīna sacrifice is made up of Atirātras, the intercalary days.

Likewise Āśvalāyana says:—

अथाहीना :—द्व्यहप्रभृतयो द्वादशरात्रपरार्ध्या अग्निष्टोमादयोऽतिरात्रान्ता मासापवर्गा अपरिमाणदीक्षाः । अतिरात्रांश्च सर्वशः । अतिरात्रस्त्वन्त्यः संख्यापूरणे गृहीतानां ॥
X, 1, 11, 12, 17-18.

"Then the Ahīnas: those days whose number is not less than two nor more than twelve, which are called after Agnishṭoma and other sacrifices (performed on those days), which end with an Atirātra, which complete a month, and during which the number of days of initiatory rite is unlimited (are Ahīnas). Some teachers call all these days

by the name, Atirātra. But the Atirātra day is the las
day completing the selected Ahīna period."

Now the word Atirātra is a name of the intercalar
day. Hence the Ahīna period, which is said to end i
an intercalary day, must necessarily be the last of th
days extending from two to twelve days of the fourt
year of any cycle.

This period is subdivided into three minor period
that of *dīkshā* or initiatory rite for a desired number o
days, that of Sutyā or Soma pressing days, and the las
that of Atirātra or intercalary day. The manner o
performing sacrifices during such days is described b
Āśvalāyana thus :—

चक्राभ्यां तु पर्वान्तरेषु चरंति । अहर्विपर्ययं पक्ष.विप-
र्ययं वा । संवत्सरांते समानपक्षेऽभिषेचनीयदशपेयौ ॥

IX, 3, 5, 6.

"During the days intervening between any tw
Parvas (for example, the full moon day and the close o
the solar year), sacrificers observe their sacrificial rites
wheel-like procedure; by alternate days or by alterna
Pakshas. At the close of the year, and in the same ha
of the month the rite of ablution and the rite of the Te
Priests' drink (are performed)."

Gārgya Nārāyaṇa's Commentary on the above Sūtra
is as follows :—

चक्रशब्देन दर्शपूर्णमासावुच्येते । सौर्याचांद्रमसाविति
केचित् । पर्वान्तरेष्विति--पर्वणामतराळे यान्यहानि तेषु
चक्राभ्यां यागः कर्तव्यः । पर्वान्तरेषु चक्राभ्यां यागे क-
र्तव्येऽहर्विपर्ययं पक्षविपर्ययं वा कृत्वा चरेयुः । अहर्विप-
र्ययो नामैवं भवति । एकस्मिन्नहनि पौर्णमास्या अपरस्मि-
न्नहनि अमावास्यायाः पुनरपि पौर्णमास्याः पुनरप्यमवा-
स्याया इति । पक्षविपर्ययो नाम कृष्णे पक्षे पौर्णमास्या
श्शुक्ले पक्षे अमावास्याया इत्येवं पुनरप्येवम् ॥

"The word wheel (chakra) means new and full moon days. Some take it to mean solar and lunar (years). In the interval between any two Parvas, *i.e*, on the days intervening between any two Parvas, sacrifice should be performed by wheel-like procedure. In performing sacrifice by wheel-like procedure in the interval between any two Parvas, they should make the sacrificial days or Pakshas alternate one after another: on one day the rite of full moon; on the next day the rite of new moon; again the rite of full moon; and again the rite of new moon. This is what is meant by alternate Pakshas: in the dark half of the month, the rite of full moon, and in the light half the rite of new moon; thus again."

From the above definitions it is clear that the sacrifice termed Ahīna was a cyclic sacrifice performed at the close of every cycle of four years and that the number of days during which it was performed was greater or less according as the day of the first new or full moon day occurring in the first year of any new cycle was nearer to or farther from the closing intercalary day of the previous cycle. As the wolfish moon was so uncertain in its movements that the question of determining the exact day of new or full moon appeared to be beyond solution, the Vedic poets seem to have begun their sacrificial performance on the fourteenth day and completed it on the fifteenth or the sixteenth day sometimes, if it were an ordinary new or full moon sacrifice; but if it were an Ahīna sacrifice, even then they seem to have followed the same procedure of beginning on the fourteenth day and continuing it till the close of the cyclic year. Hence, essential as was the exact determination of new or full moon day for the proper performance of their sacrifices, still its determination was not of so much importance as the problem of finding out the exact day on which the Atirātra or the intercalary day itself would fall. One of the two rules to find out the Atirātra day was based on the civil year of 360 days. To every fourth civil year

they added twenty-one days in order to adjust it wi the solar year and called the twentieth of these twent one days by the name, Ketu, or ensign day. The oth rule to find out the intercalary day consisted in dividi the number of years by four and finding out which w the Kṛita, the fourth or the leap year, and which was n as is even now done. The ensign day is thus describ in both the Ṛigveda and the Atharvaveda :—

"These two move on one after another by mag two playing young ones then go about the sea; the c looks abroad upon all beings; thou, the other, dispos the seasons art born new."

"Ever new art thou, being born; sign (Ketu) the days, thou goest to the apex of the dawns; th disposest their share to the gods as thou comest; th stretchest out, O moon, a long life-time."

"O stem of Soma, lord of fighters! not deficie verily, art thou by name; make me, O first sight (*Darśa* new moon), not deficient by progeny and by riche A. V. VIII, 81, 1-3.

The first verse is addressed to both the sun a the moon, personified as children (Śiśu). The second a the third which occur also in Ṛigveda X, 85, 18-19 addressed to the moon alone. The word 'Ketu' wh means 'a flag' should be noticed here. Now the syst of astronomy of the Mexicans is admitted to be a co of that of the ancient Hindus. It follows, therefore, t the numerical notation employed by them in worki out their astronomical problems must also be similar that of the Hindus. Among the Mexicans the sign the numeral 'twenty' was a flag.[1] Accordingly, if substitute 'twenty' for 'Ketu' in the sentence of t Atharvaveda, it would mean 'twenty of days, thou goe to the apex (*agre* = in front) of the dawns.' Now bo

[1] See Prescott's *History of Mexico*, P. 35, Authorised Edition 18 and *Encyclopaedia Britannica* under Mexico.

among the ancient Hindus and the Mexicans the year adopted for practical purposes was the Sāvana or civil year of 360 days. Accordingly four civil years would fall short of four tropical years by twenty days, the twentieth day being marked by a full moon or new moon and being the apex or precursor of the extra twenty-first day, the dawn or the cow. There can be no doubt that this is what was meant by the phrases, '*ketu* of the days' and 'apex' (*agre* = in front) of the dawns for the intercalation of twenty-one days is clearly stated in the Śatapatha Brāhmaṇa :—

"Now this (sacrificer), having conquered by means of the supreme stoma—the Chatushṭoma, the Kṛita among dice—on the next day establishes himself on the Ekaviṁśa (twenty-first), as a firm fonndation." XIII, 3, 2, 2.

This passage seems to be a riddle, difficult to solve. But the words 'Chatushṭoma,' 'a collection of four,' 'Kṛita' 'the cycle of four years,' 'the Ekaviṁśa,' 'the twenty-first,' furnish a clue for its satisfactory interpretation. As we shall see, the word 'Kṛita' is a name of every fourth year as well as of number 'four' in dice-play. Hence the word 'Chatushṭoma' and 'Kṛita' mean a set of four. Accordingly, the passage means that the sacrificer, who has passed any four years of 360 days each, has to wait for twenty-one days before reaching the firm foundation, the commencement of the solar year.

As the Mexicans regarded the last five days of each solar year as unlucky,[1] so the Hindus of the Vedic period seem to have also regarded in every cycle of four years twenty days as specially unlucky. The sacrificer seems to have considered himself as fettered in Varuṇa's bonds during these twenty or twenty-one days, and to have worn round his neck a golden necklace consisting, as already pointed out above, of a rectangular piece of gold containing twenty-one points carved on it.

[1] P. 35, Prescott's *History of Mexico* ; and P. 116, *Story of Maxico.*

After the prayer addressed to the sun and moon quoted above, there occurs in the Atharvaveda in the order—a prayer to Agni and then, next to it, a prayer for release from Varuṇa's bonds. The fourth and fifth verses addressed to Agni run as follows :—

" Agni hath looked after the apex of the dawns, after the days; he, first, Jātavedas, a sun, after the dawns, after the rays, after heaven and earth, he entered."

" Agni hath looked forth to meet the apex of the dawns, to meet the days, he, first, Jātavedas, and to meet the rays of the sun in many places; to meet heaven and earth, he stretched out."[1] A. V. VII, 82, 4 and 5.

The third and fourth verses addressed to Varuṇa for release from his bonds are thus translated by Prof. Whitney :—

" Loosen up the uppermost fetter from us, O Varuṇa, loosen down the lowest, off the middle-most; then we may, O Āditya, in thy sphere (vrata) be guiltless unto Aditi."

" Release from us, O Varuṇa, all fetters, that are uppermost, lowest, that are Varuṇa's; remove from us evil-dreaming and difficulty; then we may go to the world of the well-done." A. V. VII, 83, 3, 4.

That release from Varuṇa's bonds was effected on the twenty-first day, is indicated in the Śatapatha Brāhmaṇa :—

" Mitra's share thou art, Varuṇa's lordship! . . . . the Ekaviṁśa-stoma !—by means of the twenty-one fold hymn-form, he frees both rain and wind for living beings from evil and from death." S. B. VIII, 4, 2, 6.

What is meant in the above passage is this :—Varuṇa is the God of rain and water. At the close of every fourth civil year, the rainy season with which the solar year seems to have been begun would delay by

[1] Whitney's translation.

twenty-one days, which make the difference between four civil years and four solar. Hence to release the fettered rain and wind, the sacrificer must wait for twenty-one days and commemorate the arrival of the dawn on the twenty-one-versed day, *i.e.*, the twenty-first day, by establishing or rekindling the sacrificial fire and by praying to the dawn, Agni, and Varuṇa as described in the hymns of the Atharvaveda quoted above. The custom of rubbing the sacrificer clean with twenty-one handfuls of Darbha grass seems to symbolise the act of getting rid of the twenty-one intercalary days.[1]

Thus the words 'four,' 'Kṛita,' and 'twenty-first,' clearly indicate that the dawn on which the sacrificer of the Vedic times attained his firm foundation must be the same dawn that is said to follow 'Ketu' or twenty days after the close of every fourth civil year. The occurence of the ensign or the twentieth day in the light half of the month is thus described in the Ṛigveda :—

" This moon, Indra, has lighted up the unlustrous night, and days, and nights, and years : the gods of old have established it as the ensign (Ketu) of days and it has made the dawns generated in light."

" The gods made Agni Vaiśvānara, the indicator (Ketu) of days for the sake of the whole world, who stretched out of the radiant dawns, and as he moves along, scatters the darkness with his light." R. V. X, 88, 12.

Though Prof. Wilson has taken the word 'Ketu' sometimes in the sense of 'indicator', and at other times in the sense of 'sign' or 'ensign' following Sāyaṇa, the real meaning of that word must necessarily be twenty, inasmuch as it is always found used in association with the dawn or Agni, the intercalary day. In his note on the translation of R. V. III, 3, 3, Prof. Wilson remarks regarding the word 'Ketu' as follows :—"*Ketum Yagnānām* : *Ketu* is properly a banner ; but it is repeatedly used in

[1] See *Aitareya Brahmana*, Book I, 1, 3.

the Veda in the sense of *prajnāpaka*, a sign, a signal, th which makes anything known." The verse itself, in whi the word thus commented on occurs, runs as follows :—

"The wise worship with pious rites Agni, the si of sacrifices, the accomplisher of the solemnity, in who the reciters of his praises have accumulated their acts devotion, and from whom the worshipper hopes f happiness." R. V. III, 3, 3.

We are told in the passage of the Śatapatha Brāhma quoted above that the sacrificer of the Vedic times attain his firm foundation by 'Chatushṭoma' and by Kṛita amo dice. The information so far gathered by a number Oriental scholars regarding the game of dice is summaris by Prof. Eggeling in a note on his translation of t Śatapatha Brāhmaṇa (Vol. IV, P. 107) as follows :—

"The allusions to the game of dice in the ear literature are not sufficiently definite to enable us to for a clear idea as to the manner in which the game w played. Sāyaṇa, on Taitt. S. 1, 8, 16, remarks that t dice here used consisted either of gold *cowries* (shel or of gold (dice shaped like) Vibhītaka nuts. That t brown fruit of the Vibhītaka tree (Terminalia Bellerica) being about the size of a nutmeg, nearly round, with fi slightly flattened sides—was commonly used for th purpose in early times, we know from the Ṛigveda; b we do not know in what manner the dice were mark in those days. According to the commentators, t game is played with five dice, four of which a called Kṛita, whilst the fifth is called Kali; and if a the dice fall uniformally (ekarūpa)—*i.e.* with the mark sides either upwards or downwards—then the play wins, and in that case the Kali is said to overru the other dice. In this case the Kali would seem t represent the king. Kāty. Sr. S. XV, 7, 18-19, how ever, admits of another mode of playing, by which th Kali represents the Sajāta tribesman, whilst the king an

those that come after him (in the enumeration in paragraphs 15-20) play the Kṛita, &c. To understand this mode we have probably to turn to Chānd. Up. (IV, 1, 4) where it is said of the saint Raikva, that everything good fell to him, just as the lower dice (or casts) submit to the conquering Kṛita. Here the commentators assign the names Kṛita, Treta, Dvāpara, and Kali to different sides of the dice, marked respectively with 4, 3, 2, and 1 marks. (anka).—In Taitt. Br. I. 7, 10, the game at dice at the Rājasūya, is referred to as follows:—With 'this king has overcome the regions' he hands (to the king) five dice; for these are all the dice: he hereby renders him invincible. They engage to play for a dish of rice (odana), for that is (a symbol of) the chief: he thus makes him obtain every prosperity. He addresses them (with the epithets of) 'far-famed, most prosperous, true king.' The commentary and the Sūtras then supply the following explanations:— 'The keeper of the dice (akshāvāpa) having (marked off and) raised the gambling ground (by means of the wooden sword), and sprinkled it, throws down more than a hundred or more than a thousand gold dice. From them he takes five dice and hands them to the king: these, as representing the five regions, are taken to include all those dice.' These explanations, so far from clearing up the doubtful points, seem rather to add to them. It may be noted, however, that in the well-known hymn Ṛik. S. X, 34, in which the gambler's state of mind is pictured in very expressive language, the dice of the game are apparently spoken of as tripanchāśa vrata, or 'the troop of fifty three' (or thrice five, according to Ludwig's rather improbable conjecture)."

The above remark of Prof. Eggeling leaves no doubt about the prevalence of the game of dice from the earliest down to our own times. But the manner in which the game was played in ancient times cannot certainly be the same as it is now. Now-a-days two rectangular pieces of ivory or horn marked on each of the four sides

with 6, 4, 2, and 1, are thrown on the ground; and eac player leads his eight dice-men through 54, 60, 72 out of 96 houses marked on a piece of cloth, b taking one or two dice-men at a time through as man houses as the number on the surface of the two throw pieces. If the number on the thrown pieces is such a leads one or two dice-men of a player to the same hou as is occupied by one or two of his opponent's dice men, then the latter takes back his dice-men to the fir house again and begins his play afresh with the defeate pieces. But in ancient times the method of play wa quite different. The game of dice formed part of th sacrificial ceremony connected with the establishment the sacred fire. Taking a cow belonging to the sacrifice a number of players used to go along the streets of town or village, and making the cow the stake, they use to play at dice in different batches with those who deposit ed grain as their stake. Each player used to throw o the ground a hundred or more *cowries* (shells); and whe the number of the *cowries* thus cast and fallen with the face upwards or downwards, as agreed upon, was exactl divisible by four, then the sacrificer was declared to hav won; but if otherwise, he was defeated. With the grai thus won, four Brāhmans used to be fed on the day o sacrifice. That this was the nature of the custom tha prevailed in those days, is clear from the following Sūtra of Āpastamba and Agniswāmi's commentary thereon.

कृतेन यजमानो विजिनाति ॥ Āp. Śr. S. V, 20, 1.

"The sacrificer wins by Kṛita."

The commentary runs as follows:—

कृतत्रेताद्वापरकलिनामानो द्यूतप्रकारा ये कृतमयाना-मिति श्रुतावया इत्याख्यायंते । न्युप्तेष्वक्षेषु चतुष्कशो विभज्य-मानेषु यत्र सर्वे भागास्समा भवंति तत्कृतं नाम । अथ यत्रां-ततस्त्रयोवशिष्यते सा त्रेता । यत्र द्वौ स द्वापरः यत्रै-

कस्सकलिः । तथा च श्रुतिः 'ये वै चत्वारस्स्तोमाः कृतं तत् । अथ ये पंच कलिस्सः' इति । तत्राक्षाणां शतत्वात् कृतेन प्रकारेण यजमानो विजिनाति विजयते.

"Kṛita, Treta, Dvāpara, and Kali are the names of the different forms of the game of dice as referred to in 'Kṛita among the forms of dice-play' (Kṛishṇa Yajus IV, 3, 3). When the number of dice thrown can be arranged into groups of four each and all the groups consist of the same number, it is called Kṛita; and when there is a remainder of three at last, it is Tretā; when two, it is Dvāpara; when one, it is Kali. Accordingly the Veda (Taittirīya Brāhmaṇa I, 7, 10) says:—'That is Kṛita which consists of groups of four each; and that is Kali which consists of five.—As here there are a hundred dice, it is by the form of Kṛita play that the sacrificer wins."[1]

Āpastamba further says in the same place that the cow should neither be killed nor cut into parts, alluding, of course, to the defeat of any one of the players engaged on behalf of the sacrificer.

It is, therefore, clear from the above passages that the word, 'Kṛita,' whether used in connection with years or dice, was a name signifying a set of four or multiples of four; that the word 'Tretā' was a name given to three or to any number which, when divided by four, left a remainder three; that the word Dvāpara was a name given to the number two or any number which, when divided by four, left a remainder two; and that Kali signified one or any other number which, when divided by four, left a remainder one. To this effect there are a number of passages in the Bhagavatī Sūtra, a voluminous work on Jaina religion, consisting of dialogues between Mahāvīra, the twenty-fourth Tīrthankara and

[1] Compare Mahidhara's Commentary on *Vajasaneyi Samhita*, X, 2, 8, and X, 30.

Gautama, his disciple. One of those several passag devoted to the description of Yugas runs as follows :—

> कयिणं भंते जुम्मा पण्णत्ता ? गोयम चत्तारि जुम्मा पण्णत्ता । तं जहा । कयजुम्म तेयोजे दावरजुम्मे कलिनुगे । से केणत्थेण भंते ? एवं उच्चयि जाव कलिनुगे गोयम । जेणं रासी चयुक्केणं अवहारेणं अवहरिमाणे चयुपज्जवसिये से तं कयजुम्मे । जेणं रासी चेयुक्केणं अवहारेणं अवहीरमाणे तिपज्जवसिये से तं तेयोजे । जेणं रासी चयुक्केणं अवहारेणं अवहीरमाणे दुपज्जवसिये से तं दावरजुम्मे । जेणं रासी चयुक्केणं अवहारेणं अवहरिमाणे एकपज्जवसिये से तं कलिनुगे । से तेणत्थेणं गोयम ॥[1]

"How many, O Lord, are the Yugmas declarec Four, O Gautama, are the Yugmas declared as Krit yugma, Tryoja, Dvāparayugma, and Kalyoja. In what sens O lord ? Thus they are defined up to Kalyoja, Gautam That number which when divided by four ends in fo is, verily, Kṛitayugma ; that number which when divid by four ends in three as remainder is, verily, Tryoj that number which, when divided by four, ends in t as remainder is, verily, Dvāparayugma ; and that numb which when divided by four ends in a remainder one i verily, Kalyoja. It is in this sense, Gautama, they a defined up to Kalyoja."

Abhayadevasūri's commentary on this above passag runs as follows :—

> गणितपरिभाषया समो राशिर्युग्ममित्युच्यते । विषमस्तु ओज इति । तत्र च यद्यपि द्वौ राशी युग्मशब्दवाच्यौ द्वौ च ओजश्शब्दवाच्यौ भवतः । तथापीह युग्मशब्देन राशयो विवक्षिताः । अतश्चत्वारि युग्मानि राशय इत्यर्थः । तत्र कयजुम्मेति.—कृतं सिद्धं पूर्णं ततः परस्य राशिसं-

[1] 1371-2, *Bhagavati Sutra*, Jaina Prabhākara Press, Benares, 1882.

ज्ञांतरस्याभावेन न त्र्योजःप्रभृतिवदपूर्णं यद्युग्मं समराशिविशेषः तत्कृतयुग्मम् । त्र्योज इति.—त्रिभिरादित एव कृतयुग्माद्वोपरिवार्तिभिरोजो विषमराशिविशेषः त्र्योजः । दावरजुम्मेति.—द्वाभ्यामादित एव कृतयुग्माद्वोपरिवार्तिभ्यां यदपरं युग्मं कृतयुग्मादन्यत्तन्निपातनविधेः द्वापरयुग्मम् । कलिनुगेति.—कलिना एकेन अदित एव कृतयुग्माद्वोपरिवर्तिना ओजो विषमराशिविशेषः कल्योज इति । जेणं राशीत्यादि,—यो राशिश्चतुष्केणापहारेणापह्नीयपाणश्चतु.पर्यवसितो भवति स कृतयुग्ममभिधीयते । यत्रापि राशौ चनूरूपत्वेन चतुष्कापहारो नास्ति सोऽपि चतुःपर्यवासितत्वसद्भावात्कृतयुग्ममेव । एवमुत्तरपदेष्वपि[1] ॥

In mathematical terminology an even number is called 'Yugma,' and an odd number 'Ojaḥ.' Here there are, however, two numbers deserving of the name Yugma and two numbers deserving of the name 'Ojaḥ.' Still, by the word 'Yugma' are meant numbers in general. Hence four Yugmas, *i.e.* four numbers. Of them Kṛitayugma :—Kṛita means accomplished, *i.e.* complete, for the reason that there is no other number after four, which bears a separate name (*i.e.* a name different from the four names Kṛita and others). That number which is not incomplete like Tryoja and other numbers, and which is a special even number is Kṛitayugma. As to Tryoja :—that particular odd number which is uneven by three from the first (three) or from above a Kṛitayugma is Tryoja. As to Dvāparayugma :—that number which is another even number like Kṛitayugma, but different from it and which is measured by two from the beginning or from above a Kṛitayugma is Dvāparayugma—Dvāpara is a special grammatical word. As to Kalyoja :—that special uneven number which is odd by Kali, *i.e.* one from the beginning or by one added to a Kṛitayugma is called, Kalyoja. 'That number etc.' :—That number which, when

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[1] P. 1391-2 *Bhagavati Sutra.*

divided by four, ends in complete division, is Kṛitayug In the series of numbers, the number four, though need not be divided by four because it is itself four, also called Kṛitayugma. Likewise the next numbers."

The recurence of Kṛitayugma, the same as Kṛi yuga, either in the dark half or light half of the month also alluded to in the Bhagavatī Sūtra. Surprised, perha at the thought that though born on the auspicious of the Kṛitayugma, some persons commit sin and thereby destined to hell, Gautama addresses Mahāvīra follows :—

कण्हपक्खियरासिजुम्मणेरयियाण भंते कनु उववज्जंति ?
सुक्खपक्खियरासिजुम्मकयजुम्मणेरयियाणं भंते कनु उवव-
ज्जंति ॥[1]

"Why are persons destined to hell born on the d of Kṛitayugma in the dark half of the month, O, lor And why are they born on the day of Kṛitayugma in t light half of the month, O, lord ?"

Mahāvīra's answer to this question is not of so mu importance to us as the question of Gautama referring the occurence of Kṛitayuga in the dark or light half the month. It need not be explained that what Gautam meant by a Kṛitayugma in the light or dark half of th month was the close of the bissextile or leap year either i the light half or dark half of the month. There ca therefore, be no doubt that the word Kṛita or Satya wa originally used to signify every fourth civil year of 36 days with twenty-one intercalary days, or every fourth solar year of 366 days. Nor can there be any doubt that it is the intercalary day which, in the Vedas and the Brāhmaṇas, is called by the names—cow, mutilated child Indra, Agni, Prajāpati, and golden cow or golden day.

[1] P. 1931 *Bhagavati Sutra.*

"The date of the collection, or perhaps more correctly, the composition of the Jaina Canon would fall somewhere about the end of the fourth or the beginning of the third century B.C." P. 43, Preface to Translation of the *Achārānga Sutra of the Jainas by* Hermann Jacobi.

CHAPTER V.

Foreign Testimonies

Knowing what the Vedic poets meant by the word 'Cow' when they used it in connection with time, we can very easily understand what they meant by 'Gavām Ayana' or 'Cows' Walk.' The word '*go*,' 'cow,' is, as pointed out above, a name of the intercalary day which, being the product of the four quarter days of any four consecutive solar years of 365 days each, was added to the fourth year or allowed to accumulate so as to form a separate year like the Sothic period of the Egyptians. A Cow, therefore, means a set of four years, and Cows' Walk of two days, a set eight years. Similarly a Cows' Walk of one month or thirty days signifies one hundred and twenty years, and that of ten months, one thousand and two hundred years. Accordingly the two kinds of Cows' Walk, one of ten months and the other of twelve months, so vividly described in the Yajurveda and the Brāhmaṇas must necessarily mean two periods, the one of 1,200 years and the other of 1,440 years, corresponding to the 300 and 360 intercalary days, respectively.

It should not, however, be supposed that the practice of counting the years by the number of intercalary days was a thing peculiar to India alone. It obtained in Egypt; it obtained in Rome; and it obtained in Mexico. But not understanding the significance of one day's years, two days' years and so on, even the most distinguished historians and astronomers of Europe failed to perceive that the name 'day' was used to denote a cycle of years. In his *Historical Survey of the Astronomy of the Ancients*, Sir George Cornewall Lewis says:—"Of the testimonies respecting a short Egyptian

year, the only one entitled to much consideration is t
of Exodus, who (according to the report of Proclu
writer of the fifth century after Christ) stated that
Egyptians designated a month by the appellation o
year."[1] "The statements of later writers, that the origi
Egyptian year consisted of four months, or of th
months—the division being in one case determined
three seasons and in the other by four seasons—
apparently of later fabrication." "The ancient Egypti
are, moreover, stated by some of the late chronograph
to have given the appellation of a year even to a day
"The most celebrated, however, of the abnormal year
the ancient Roman year attributed to the institution
Romulus. The belief in an original year of ten mon
was prevalent among the antiquarian and historical wri
of Rome."[3]

The belief in the so-called abnormal years of a d
of a month, of three months, of four months, &c., is not
questionable as the explanation of Sir G. C. Lewis and oth
astronomers regarding the significance of those year
It is certain that there was a reckoning of tim
by abnormal years. The theory put forward here
that these abnormal years denoted periods of tim
containing as many cycles of four years as the
were days in the abnormal years. Neither the Egyp-
tians nor the Romans can be believed to have bee
so ignorant as to be incapable of comprehending th
real aspect of the year. "If they had not," says Sir G. C
Lewis in his Astronomy, "carried their observations of the
sun's course so far as to form an idea of a year, they
could have had no name for this important measure of
time. As soon as they formed an idea of a year, they
would naturally give it a name; but this name must have

[1] P. 32, *Astronomy of the Ancients*,

[2] P. 33. *Astronomy of the Ancients.*

[3] P. 34, Ibid.

been different from that by which they signified a day."[1] That the ancient Egyptians were familiar with the conception of a year as contrasted with a day, is beyond question. Equally unquestionable is the statement of historians, that the Egyptians believed in a year of a day, of a month, and so on. Hence the only explanation of this contradiction in terms is that like the Aryans of the Vedic period, both the Egyptians and the Romans resorted to the simple way of counting the years by the number of the intercalary days which they added to every fourth year. The decimal system of notation was not in existence in those days; nor was the art of writing known. They were, therefore, obliged to keep by means of reeds, or by means of the syllables of any of their special prayers, an account of the years that had elapsed since their reckoning began. Reeds or Kuśa grasses are liable to destruction by fire or by worms. Though they could trust to their memory, they might have found it a laborious task to preserve an immense number of syllables or words corresponding to a large number of years since elapsed. They seem, therefore, to have had recourse to the counting of the intercalary days as one of the simplest ways of keeping a reckoning of elapsed years.

That the days of the so-called abnormal years truly denoted four times as many ordinary solar years is also borne out by the history of the Aztecs. In his '*History of Mexico*' W. H. Prescott says :—

" In the measurement of time, the Aztecs adjusted their civil year by the solar. They divided it into eighteen months of twenty days each. Both months and days were expressed by peculiar hieroglyphics—those of the former often intimating the season of the year, like the French months at the period of the Revolution. Five complementary days, as in Egypt, were added, to make up

[1] P. 34, *Astronomy of the Ancients.*

the full number of three hundred and sixty-five. Th belonged to no month, and were regarded as peculia unlucky. A month was divided into four weeks of f days each, on the last of which was the public fair market day. As the year is composed of nearly s hours more than three hundred and sixty-five days, the still remained an excess, which like other nations w have framed a calendar, they provided for by intercalatio not, indeed, every fourth year, as the Europeans, but longer intervals like some of the Asiatics. They wait till the expiration of fifty-two vague years, when th interposed thirteen days, or rather twelve and a half, th being the number which had fallen in arrear. The Persia had a cycle of one hundred and twenty years of thre hundred and sixty-five days each at the end of whic they intercalated thirty days. Such was the astonishin precision displayed by the Aztecs, or perhaps, by the Toltec predecessors in these computations, so difficult a to have baffled till a comparatively recent period th most enlightened nations of Christendom."[1]

" The chronological system of the Mexicans by which they determined the date of any particular event, was als very remarkable. They threw the years as already noticed, into great cycles of fifty-two each which they called ' sheafs ' or ' bundles,' and represented them by a quantity of reeds bound together by a string. As often as this hieroglyphic occurs in their maps, it shows the number of half centuries. To enable them to specify any particular year, they divided the great cycle into four smaller cycles, or indications of thirteen years each. They then adopted two periodical series of signs, one consisting of numerical dots up to thirteen, and the other of four hieroglyphics of the years (These hieroglyphics were a ' rabbit,' a ' reed,' a ' flint,' a ' house.' They were taken as symbolical of the four elements,—air, water, fire,

[1] P. 35, Prescott's *History of Mexico.*

and earth.)[1] These hieroglyphics they repeated in regular succession, setting against each one a number of the corresponding series of dots continued also in regular succession up to thirteen. The same system was pursued through the four indications, which, thus, it will be observed, began always with a different hieroglyphic of the year from the preceding; and in this way each of the hieroglyphics was made to combine successively with each of the numerical signs, but never twice with the same; since four and thirteen, the factors of fifty-two—the number of years in the cycle—must admit just as many combinations as are equal to their product. Thus every year had its appropriate symbol by which it was at once recognised. And this symbol preceded by the proper number of 'bundles' indicating the half centuries showed the precise time which had elapsed since the national epoch of 1,091. The ingenious contrivance of a periodical series, in place of the cumbrous system of hieroglyphical notation is not peculiar to the Aztecs, and is to be found among various peoples on the Asiatic Continent. The solar calendar above described might have answered all the purposes of the nation; but the priests chose to construct another for themselves. This was called a 'lunar reckoning,' though nowise accommodated to the revolutions of the moon. (In this calendar the months of the tropical year were distributed into cycles of thirteen days, which being repeated twenty times—the number of days in a solar month—completed the lunar or astrological year of 260 days when the reckoning began again).[2] It was formed also of two periodical series; one of them consisting of thirteen numerical signs or dots, and the other of the twenty hieroglyphics of the days. But as the product of these combinations would only be 260, and as some confusion might arise from the repetition of the same terms for the

[1] Foot-note, P. 36, *History of Mexico.*

[2] Foot-note, P. 38, *Ibid.*

remaining 105 days of the year, they invented a third series, consisting of nine additional hieroglyphics, which alternating with the two preceding series rendered it impossible that the three should coincide twice in the same year, or indeed in less than 2,340 days, since 20 × 13 × 9 = 2,340. Thirteen was a mystic number of frequent use in their tables. Why they resorted to that of nine on this occasion is not so clear. [They (the thirteen hieroglyphics) were named 'companions' and 'lords of the night' and were supposed to preside over the night, as the other signs (the nine hieroglyphics) did over the day. Thus the astrological year was divided into ten months of 13 days; there were thirteen years in their indications, each of which contained three hundred and sixty-five periods of thirteen days, &c. It is a curious fact that the number of the lunar month of thirteen days contained in a cycle of fifty-two years with the intercalation should correspond precisely with the number of years in the great Sothic period of the Egyptians, namely 1,461 : a period in which the seasons and festivals came round again to the same place in the year. The coincidence may be accidental. But a people employing periodical series and astrological calculations have generally the same meaning in the numbers they select and the combinations to which they lead.]"[1]

We have to sift carefully the historical facts relating to the astronomical system of the Aztecs from the author's explanations with which they are blended here. The historical facts are :—.

In order to adjust their solar years of 365 days each the Aztecs intercalated thirteen days at the close of every cycle of fifty-two years. Their method of representing their years in their calendar was by dots and picture-signs. One dot denoted one year, two dots denoted two years and so on, up to thirteen years, after which the numerical dots from one to thirteen were repeated again. The four

[1] Foot-note P. 38, *Ibid.*

principal picture-signs apart from the dots to represent the years were rabbit (*Tochtli*), reed (*Acatl*), flint (*Tecpatl*) and house (*Calli*), which were repeated thirteen times in the course of their cycle of fifty-two years. Also they seem to have had a set of thirteen separate symbols to represent the thirteen intercalary days in their cycle. The other set of nine symbols seems to have been devised to represent the nine weeks of five days each, being the difference between four lunar and four solar years. Just as the Vedic poets called the intercalary days by the name, '*Atirātras*,' 'overnights,' so the Aztecs, too, seem to have called those days 'nights' and their symbols 'lords of nights.' It follows, therefore, that the so-called astrological year of 260 days, represented by repeating twenty times the set of thirteen symbols, is not an ordinary abnormal year of 260 consecutive days, but an era of 260 intercalary days, gained in the course of twenty times fifty-two years, or 1,040 tropical years. As regards the number, 2,340, there can be no doubt that it represents the difference in weeks between 1,040 lunar and 1,040 tropical years. It is well known that a lunar year falls short of a tropical year by $11\frac{1}{4}$ days. Hence in the course of 1,040 years the difference will amount to $\frac{1040 \times 45}{4} = 11{,}700$ days, which are equivalent to $\frac{11700}{5} = 2{,}340$ weeks of five days each. This must be the meaning, if there is any meaning at all, in the numbers employed by the Aztecs. In the epoch-making horse-sacrifice, described in both the Black and White Yajurvedas, the same numbers play an important part in the arrangement of sacrificial animals. In this sacrifice, two hundred and sixty wild animals are placed in sets of thirteen each in the twenty spaces between twenty-one stakes, while three hundred and ninety domestic animals are, as will be seen, bound to the stakes themselves. The correspondence between twenty sets of thirteen sacrificial victims each to the twenty sets of thirteen picture-signs each employed

by the Aztecs in their astronomical calendar is too pla
to need pointing out. As regards the number, 390,
seems to represent the lunar intercalary months, while th
number, 2,340, of the Mexicans represents the sam
intercalary period in weeks of five days each; for th
difference of 11,700 days between 1,040 solar and luna
years is exactly equal to $\frac{11700}{30} = 390$ months. This lead
us to the question, whether the sacrificial animals ar
live victims intended to be immolated during the sacrifice
or whether they are picture-signs once used as day or
month symbols, as in the Aztec calendar? Almost al
commentators take all the animals to be real victims, of
which the domestic animals are required to be slaughtered
and the wild animals to be released at the close of the
sacrifice. There are, however, in the list of the wild
animals, some beasts, such as the lion, tiger, crocodile,
snake, &c., too fierce and cruel to be captured and kept in
the spaces between the stakes in the sacrificial hall. In
his commentary on the Black Yajurveda (V, 5, 11)
Bhaṭṭabhāskara says:—

दुर्ग्रहांस्तान्सिहादीन् चित्रपटे लिखित्वा उपाकरणादि कु-
र्यादित्येके ॥

"Some are of the opinion that the lion and other
beasts which are difficult to capture may be painted on a
piece of cloth and made use of." It is, however, probable
that the Vedic poets framed their calendar by making use
of the pictures of all familiar animals, whether wild or
domestic, and that on the day of sacrifice they slaughtered
such edible animals as were similar to the picture-signs,
signifying the date, week, month, year and other time-
divisions of the day. There is reason to believe that the
names of those animals, whose pictures were once used as
convenient signs in the absence of writing and decimal
notation to signify days, weeks, months and other time-
divisions, were selected in later times by virtue of associ-
ation as the names of the ecliptic divisions as well as of

the constellations. For the very animals, which constitute the zodiacal signs of the Chinese as well as of the Aztecs, are found to form one of the sets of eleven sacrificial victims enumerated in the Kṛishṇa Yajurveda. (V, 5, 11, 49). The list[1] of the animals is as follows:—

इंद्राय राज्ञे सूकरः वरुणाय राज्ञे कृष्णो यमाय ऋष्य ऋषभाय राज्ञे गवयश्शार्दूलाय राज्ञे गौरः पुरुषराजाय मर्कटः क्षिप्रश्येनाय वर्तिका नीलंगोः क्रिमिः सोमस्य राज्ञः कुलंगः सिंधोश्शिशुमारः हिमवते हस्ती ॥

(1) "A pig for Indra, the king; (2) a deer for Varuṇa, the king; (3) a white-footed antelope for Yama, the king; (4) a gayal for the royal bull; (5) a white animal for the royal tiger; (6) a monkey for the lord of the people; (7) a sparrow for the swift eagle; (8) a worm for a snake; (9) a shrieking bird for the kingly moon; (10) the crocodile for the Indus; (11) the elephant for the Himālayas."

In addition to these eleven victims the sacrificer is also directed to name another beast to be bound to the twelfth sacrificial stake:—

अथोपशय एवापशुस्तस्य यजमानः पशुर्यन्न निर्दिशेदार्तिमार्छेद्यजमानोऽसौ ते पशुरिति निर्दिशेद्यं द्विष्याद्यमेव द्वेष्टि । तमस्मै पशुं निर्दिशति यदि न द्विष्यात् आखुस्ते पशुरिति ब्रूयात् ॥ (VI, 6, 4, 17. *Kṛishṇa Yajus*).

"Then the only stake that has no victim is the Upaśaya (the twelfth stake lying near the middle stake). If the sacrificer were to assign no victim to it, he would fall into distress. He should therefore assign to it whomever he hates, saying 'This is thy victim.' He, verily, assigns to it whomever he hates; if he hates none, he should say, 'A rat is thy animal'."

[1] Compare the twelfth set of thirteen wild animals enumerated in the *Vājasaneyi Saṃhita*, XXIV, 29—30.

The Chinese, as well as the Mexican, series of the zodiacal animals is as shown in the following table:—

CHINESE[1]	MEXICAN[2]
1. Rat (Aquarius)	
2. Ox	
3. Tiger	Ocelot
4. Hare	Rabbit
5. Dragon or Crocodile	Lizard
6. Serpent	Serpent
7. Horse	
8. Sheep	
9. Monkey	Monkey
10. Hen	Eagle
11. Dog	Dog
12. Pig	

The correspondence between the Vedic sacrificial victims and the zodiacal signs of the Chinese and the Aztecs is so clear that we are forced to come to the conclusion that the beasts enumerated in the Vedas in connection with sacrifices are not, as the commentators take them to be, real animals slaughtered in the sacrifices, nor zodiacal signs representing the ecliptic divisions or the constellations, but hieroglyphics intended to represent ordinary and special days, weeks, months, years and other necessary time divisions. That the zodiacal signs were originally intended to signify the divisions of time is clearly borne out by history. "It[3] is denominated by Humboldt the 'Zodiac of hunters and shepherds,' and he adds that the presence in it of atiger gives it an exclusively Asiatic character. It appears never to have been designed for astronomical employment. From the first it served to characterise the divisions of time. The nomenclature not only of the hours of the day and of their minutest intervals was supplied by it, but of the months of the

[1] and [2] *Encyclopædia Britannica*, Vol. XXIV, P. 793.

[3] P. 793, Vol. XXIV, *Encyclopædia Britannica*.

year, of the years in the oriental sixty-year cycle, and of the days in the 'little cycle' of twelve days. Nor has it yet fallen into desuetude. Years 'of the Rat,' 'of the Tiger,' 'of the Pig' still figure in the almanacs of Central Asia, Cochin China, and Japan. A large detachment of 'the cyclical animals' even found its way to the new world. Seven of the twenty days constituting the Aztec month bore names evidently borrowed from those of the Chinese horary signs. The Hare (or Rabbit), Monkey, Dog, and Serpent reappeared without change; for the Tiger, Crocodile, and Hen, unknown in America, the Ocelot, Lizard, and Eagle were substituted as analogous. The Aztec calendar dated from the 7th century; but the zodiacal tradition embodied by it was doubtless much more ancient. Of the Zodiac in its true sense of a partitioned belt of the sphere there was no aboriginal knowledge on the American Continent. Mexican acquaintance with the signs related only to their secondary function as dies (so to speak) with which to stamp recurring intervals of time."

It follows, therefore, that the sacrificial beasts arranged into sets[1] of nine, ten, eleven, twelve, thirteen or fifteen each are picture-signs intended to signify special intervals of time. Accordingly the set of eleven sacrificial animals, repeated—as pointed out in the third chapter—thirty-two or thirty-three times, corresponding to the 352 or 363 days of the 'Cows' Walk,' are evidently pictorial symbols intended to represent 'cows' or the bissextile intercalary days arranged into sets of eleven each.

It is also evident that the 420 sacrifices enumerated in the Brāhmaṇas as making up the 'Cows' Walk' of 362 days must be such as were performed in the course of 1,448 tropical years. According to Sāyaṇa's statement quoted above, it appears to be the custom with the Vedic poets to call the sacrifices performed on the intercalary

[1] See *Vâjasaneyi Samhita*, XXIV, 1-40.

days from 1 to 100 by the name, *Rātrisattras* or *Atirātrasattras* (night or overnight sacrifices), and to call the period of more than 100 intercalary days by the name, Ayana or year. Accordingly, the two Atirātra sacrifices must be the sacrifices performed on the last two extra days, after the year of 360 intercalary days was over. Leaving, therefore, 8 years corresponding to the two Atirâtras, the rest of the period of the 'Cows' Walk' amounts to 1,440 years, during which 106 Agnishṭomas, 240 Ukthyas, 12 Shoḍaśins, and 60 Shaḍaha sacrifices were performed. Accordingly, the period of one

Ukthya sacrifice is $\frac{1440}{240} = 6$ years;

that of Shoḍasi is $\frac{1440}{12} = 120$ years;

that of Shaḍaha is $\frac{1440}{60} = 24$ years;

and that of an Agnishṭoma is $\frac{1440}{106} = 13$ years, 7 months, and 6 days.

But according to another statement of the Śatapatha Brāhmaṇa which enumerates 9 Agnishṭomas in the course of one month of the 'Cows' Walk,' the same period amounts to $\frac{120}{9} = 13$ years and 4 months. Also according to others, who counted 112 Agnishṭomas in the 'Cows' Walk' of 362 days, the period of an Agnishṭoma comes to be $\frac{1448}{112} = 12\frac{13}{14}$ years, which is a little less than 13 years. Thus though there seems to be some difference in counting the number of Agnishṭomas, still from the evidence furnished from the history of the Mexicans, who divided their cycle of 52 years into four periods of 13 years each and performed their religious rites at each of the four periods, it is clear that the Vedic poets, too, performed their Agnishṭoma sacrifice once in every thirteen years.

From the foregoing considerations, it is evident that the 'Gavām Ayana' or 'Cows' Walk' of which the Ahīna sacrifices and the Rātrisattras or Atirātrasattras are other varieties, is a period made up of the intercalary days and that the sacrifices enumerated as constituting it are not, as the mediaeval Vedic commentators take them to be, sacrifices performed on as many consecutive days as those of any particular 'Cows' Walk' under observance, but they are periodic or epoch-making sacrifices performed by different persons at different intervals of time as shown above.

CHAPTER VI.

Epoch-making Sacrifices.

From considerations of various kinds of internal and external evidence, we have arrived at the conclusion that the 'Gavām Ayana' or 'Cows' walk' is a Vedic era of the intercalary days, and that the sacrifices enumerated in connection with it are sacrifices performed at different fixed intervals of time. The description of a few of these epoch-making sacrifices, briefly given in some cases and minutely in others in the Vedas and the Brāhmaṇas, tends to strengthen the same conclusion. The Viśvajit sacrifice is one of the twenty-five sacrifices performed on one of the twenty-five intercalary days, which according to Āśvalāyana form a unit of the 'Cows' Walk.' It seems to have been performed as an epoch-making sacrifice on the 250th intercalary day and is thus briefly alluded to both in the Taittirīya and the Tāṇḍya Brāhmaṇa.

पंच पंचाशतास्त्रिवृतस्संवत्सराः पञ्च पंचाशतः पञ्चदश पंच पंचाशतस्सप्तदश पंच पंचाशत एकविंशा ।विश्वसृजां सहस्रं संवत्सरम् । तदेष श्लोको भवति. विश्वसृजः प्रथमे सत्रमासत सहस्रसमं प्रसुतेन यन्तः । तेह जज्ञे भुवनस्य गोपा हिरण्मयश्शकुनो ब्रह्म नाम ॥

Tan. Br., XXV, 18, 1 and 5.

"Five times fifty sets of nine, five times fifty sets of fifteen, five times fifty sets of seventeen, five times fifty sets of twenty-one (made up) the one thousand years of the All-creators. There is this verse (about it): the All-

creators stood of old at a sacrificial session of one thousand years aspiring to attain it with Soma pressings. They are verily, become that golden bird, called Brahma, which is the protector of the world."

The passage is obscurely-worded and seems like a riddle. Still with the clue supplied by the words 'twenty-one' and 'thousand,' it can be satisfactorily interpreted. It has already been pointed out how the Vedic poets adopted the Sāvana year of 360 days for common use and adjusted it with the tropical year by adding 21 days to every fourth Sāvana year. It is these 21 days which are referred to in the passage. Hence 'five times fifty sets of twenty-one' means 250 sets of 21 intercalary days each. Two hundred and fifty sets of twenty-one will make one thousand years only when the intercalation of 21 days is repeated 250 times. So, in this context, the phrase '250 sets of 9' will mean 250 sets of 9 weeks of 5 days each. Now four lunar years fall short of four tropical years by 45 days, which are the equivalent of 9 weeks of 5 days each. Accordingly '250 sets of 9' means 250 intercalary periods of 9 weeks of five days each in the course of 1,0C0 years. Similarly, 250 sets of 15 days will give one thousand years, only when those fifteen days form the last of the three sets of fifteen days each, which are the difference between four lunar and solar years. Similarly 250 sets of 17 days will make one thousand years, only when each year is made to consist of 361 days as in the Jupiter cycle, yielding a difference of 17 days between each set of four tropical and four Jupiter's years. Surely, this must be the meaning of the first passage and there seems to be no other possible way of explaining it The 'golden bird' referred to in the second passage is no other than the intercalary day, which is called by the name 'Brahma' and 'All-creator'.

The arrangement of luni-solar intercalary days into sets of five or fifteen days each is thus referred to in the Śatapatha Brāhmaṇa (XIII, 2, 5, 1):—

"Prajāpati poured forth the life-sap of the horse (aśvamedha); when poured forth, it went from him. Having become five-fold, it entered the year, and they (the five parts) became those half-months. He followed it up by means of the fifteen-fold (sets of victims,) and found it; and having found it, he took possession of it by means of the fifteen-fold ones; for, indeed, they—to wit, the fifteen-fold (sets)—are a symbol of the half-months, and when he seizes the fifteen-fold ones, it is the half-months the sacrificer thereby takes possession of. Concerning this, they say,—'But, surely, the year is not taken possession of by him who spreads out (performs sacrifice for) a year in any other way than by means of the seasonal sacrifices. The seasonal sacrifices, doubtless, are manifestly the year; and when he seizes the Seasonal Victims, he then manifestly takes possession of the year. And, assuredly, he who spreads out the year in any other way than with the (victims) of the set of eleven (stakes) is deprived of his offspring (or subjects) and cattle and fails to reach heaven.'"[1]

The meaning of the above passage is this:—Prajāpati is the deified era of the intercalary days. His life-sap means the excess of the days of the tropical year over the lunar; these days seem to have been arranged first into groups of 5 days each and next into divisions of fifteen days each. By counting these intercalary periods of 5 or 15 days, represented by picture signs, the sacrificer can take possession of all the years that have elapsed since the commencement of reckoning the years. 'Seizing the Seasonal Victims' means identifying the picture-sign representing any particular number of intercalary periods. 'Spreading out the year' means the representation of a large number of solar years by a limited number of picture signs representing an equally limited number of intercalary periods.

[1] Prof. Eggeling's translation.

Thus it is clear that the Viśvajit sacrifice referred to in the above passage is a sacrifice performed on the 250th intercalary day, completing one thousand years in the era of the Vedic poets. But almost all mediæval commentators, not excepting even Jaimini, the author of the famous Mīmāmsa Śāstra, or Concordance of the Vedic rituals, have been so far misled as to see in the above passage an injunction (*vidhi*), prescribing a thousand years' sacrificial session; and, perplexed at such an injunction which is from their point of view incompatible with the short life of man, have discussed the question and arrived at a curious conclusion. The summary of the discussion and conclusion is as follows:—

"Is the sacrificial session of a thousand years intended for angels or for men, who have lengthened their life by means of elixir, or for generations of men of the same family? Or, is it that the life of those who undertake such a sacrifice is prolonged? Or, is it meant to be a sacrificial session of four years to be observed by 250 priests? Or, is the phrase '1,000 years' used in the sense of 1,000 months, or of 12,000 nights, or of 1,000 days? It is not meant for angels, since they do not keep the sacrificial fire at all; nor for men, since it is impossible to prolong life even by means of elixir; nor for a family, since the heavenly reward for the performance is meant only for him who completely performs it from the beginning to the end; nor is the life of any performer of such a sacrifice found prolonged; nor is it meant to be performed by 250 priests, as the number of priests is not to exceed twenty-four; nor does the interpretation of the word 'year' in the sense of a month, as warranted by the Vedic text—'That which is the month is this year,' remove the difficulty, for no man is likely to live 1,000 months after he has established the sacrificial fire at the age of 24 years or thereabout; nor is it meant to be a session of 12,000 nights, for 'twelve nights' is used not in the sense of a year but in the sense of an 'indicator'

(*pratimā*). Hence the eighth, *i.e.* the last suggestion to take the year in the sense of a day is the only possible interpretation. 'Nine' and other numbers in the passage signify not so many days, but a single day on which so many verses of prayer are sung. Hence a year means a day, and a thousand years a thousand days.[1]"

The conclusion is partly right and partly wrong. It is true that the numbers 'nine,' etc., do not denote so many days, but a single day on which nine, fifteen, seventeen, or twenty-one verses are recited, signifying as usual the lapse of so many intercalary days. But it is not true that the word 'year' is used in the sense of a day; but, on the contrary, the word 'day' is used in the sense of a cyclic year in which a day has been intercalated. Thus 'one-day-year' means the fourth year to which a day has been added; and 'one-month-year' signifies the 120th year, to which the 30th intercalary day, completing a month, is added, or by the end of which thirty intercalary days have accumulated making the beginning of the year to fall back by one month. Hence 'a thousand years' sacrificial session' means the performance of the usual sacrifice on the 250th intercalary day, which in its turn is recognised from the picture-sign in the calendar in use. If this is not the meaning of the passage in question, then where is the necessity for making a cumbersome sentence with exact and whole numbers? The authors of the Vedas and of the Brāhmaṇas cannot be believed, even for a moment, to have recited without any meaning a fixed number of verses on their sacrificial days. They cannot be believed to have felt an insensate attraction for the numbers, 250, 9, 15, 17, and 21; nor can the harmonious connection of the numbers, as explained above, with the one thousand years in question be said to be accidental. Moreover, the above passage like many other Vedic passages is not an injunction binding upon the Brāhmans the observance of a thousand years' se sion. The Vedic poets must be

[1] See Sāyana's *Commentary on Tan. Br.* XXV, 18, 7.

credited with enough common sense to remember that man's life is short, a truth which they have expressed in season and out of season. There can, therefore, be no doubt that the above passage like other passages describing the sacrifices of the 'Cows' Walk,' refers to the sacrifice performed on the last intercalary day of the one-thousandth year.

It should not, however, be urged that the above passage is merely a formula, describing the exact number of intercalary weeks, half-months and days, but not a record implying the lapse of 1,000 years; for the sentence that "the All-creators sat of old at a session of 1,000 years" refers in the past tense to what had already passed. The Śatapatha Brāhmaṇa also refers to the lapse of 1,000 years as follows (X, 4, 4, 1-3):—

"When Prajāpati was creating living beings, death, that evil, overpowered him. He practised austerities for a thousand years, striving to leave ev.l behind him. Whilst he was practising austerities, lights went upwards from those hair-pits of his; and those lights are those stars: as many stars as there are, so many hair-pits there are; and as many hair-pits as there are, so many *muhūrtas* there are in a (sacrificial performance) of a thousand years. In the one-thousandth year, he cleansed himself all through; and he that cleansed all through is this wind which here cleanses by blowing; and that evil which he cleansed all through is this body. But what is man that he could secure for himself, a (life) of a thousand years? By knowledge, assuredly, he who knows secures for himself (the benefits of a performance of) a thousand years.[1]"

Time is personified as Prajāpati here, so that all the acts done in the course of 1,000 years can be attributed to him as the continued operation of a single man. The evil referred to is nothing else than the excess of lunar days in a tropical year. The lunar intercalary month is

[1] Prof. Eggeling's Translation.

even now called '*Mala-māsa*,' 'dirty month,' and the lunar year is cleansed of the accumulated dirt once in every cycle of about 32 months. Accordingly the cleansing of Prajāpati in his one-thousandth year must necessarily imply the adjustment of luni-solar or civil-solar years by the addition of the required intercalary months or days. It is by knowledge of chronological history that one can understand the number of years that have elapsed, and the periodical intercalary months that require to be added and got rid of. As no man can 'live for a thousand years,' says the Brāhmaṇa, it is impossible to continuously sit at a session of 1,000 years. Therefore the benefits of the performance of a thousand years' session are obtained not by a single man's continuous sitting, either for 1,000 years, or for 1,000 days as the followers of Jaimini would have us think, but by knowledge of the one-thousandth year's sacrifice.

Like the Viśvajit Sacrifice, the Horse-sacifice (Aśvamedha) minutely described both in the Black and White Yajurvedas is also an epoch-making sacrifice performed on the 260th intercalary day, corresponding to the 1,040th year of the Vedic era. For the performance of this sacrifice, twenty-one Yūpas, or stakes, are erected in a row at a distance of about 101 feet from each other on the sacrificial ground. On each of the twenty spaces between the twenty-one stakes thirteen wild beasts dedicated to different deities are placed, aggregating on the whole to 260 animals. Three hundred and twenty domestic animals are bound in sets of of sixteen animals to each of the twenty stakes on both sides of the central stake. Twenty-nine beasts are bound to the central stake itself. This is the classification which Mahīdhara has adopted in his commentary on the White Yajurveda (XXIV, 1). Of these 609 animals, the two hundred and sixty wild beasts are released at the close of the sacrifice; of the remaining 349 victims, 126 are termed 'Chāturmāsya,' 'quarter-yearly' victims; 22 are called 'two

eleven decades,' and the other 201 are called Seasonal Victims.

Bhaṭṭabhāskara, on the other hand, quotes in his commentary on the Taittirīya Brāhmaṇa (III, 8, 20) two stanzas relating to the number of victims of the horse-sacrifice. Unfortunately the last portion of the second stanza is found hopelessly corrupt in all the three manuscripts procured from three different sources and now available in the Mysore Government Oriental Library. The two verses are quoted here below, with various readings as found in the manuscripts.

अश्वस्तूपरगोमृगौ तुरगपर्यंग्या दश ञ्युत्तराः[1] ।
संत्यष्टादशिनस्त्वशीतिशनकं द्वाविंशतिर्द्विद्विनः[2] ।
संत्येकादशिनस्सह[3] प्रकृतिजैर्द्वाविंशतिर्वैकृताः ।
चातुर्मास्यपशूनवैहि सशतं पंचाधिकं त्रिंशतम् ॥
भूयः पंचदशैव पंचदशिनः ग्राम्यान्नवत्युत्तरान् ।
(आरण्यान् त्रीणि शतान्यथर्तुविहितान् पशवस्त्वाष्ट्रा दशार-
ण्यजाः[4] ।)
ज्ञेयास्सूकरपूर्वकास्तु दशतोऽत्रैकादशं ते शतं भवति[5] पशवो
कोदिता विंशति ॥

Their translation is as follows: —

" The horse, the hornless goat, and gayal; the circumcorporal victims (bound round the body of the central horse) are ten and three; there are the eighteen decades (180); twenty-two are the victims dedicated to the Aśvinī stars; there are also eleven normal victims; likewise twenty-two abnormal victims; the victims dedicated to the periods of three months, be it known, are one hundred and thirty-five; there are again the sets of fifteen; there are the domestic and wild animals amounting to three hundred and ninety and arranged according to the seasons."

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[1] Vyuttarāh. [2] Tirvāsvinah. [3] Stathā. [4] The bracketed portion does not appear in the other two manuscripts. [5] Sarve pancasatibhavanti pasavosthaikonitā vimsatih.

Such is the difference between Mahīdhara and Bhaṭṭabhāskara in the classification and arrangement of the so-called *paśus* or sacrificial victims. Following Bhāskara's classification, the significance of the 260 wild animals and of the 390 domestic animals has already been explained. The significance of the other minor sub-divisions adopted by him is not so clear. As to the 349 domestic animals, according to Mahīdhara, they seem to represent the difference between 1,040 civil years and 1,040 tropical years, arranged into sets of 15 days each;

$$\text{for } \frac{1040 \times 5}{15} = 346\tfrac{2}{3}$$

Again, with reference to the 201 Seasonal Victims, these seem to represent as many seasons, or two-month periods of 58 days, as there are between 1,040 lunar years and 1,040 solar years; for $\frac{1040 \times 45}{4 \times 58} = \frac{11708}{58} = 201\frac{42}{58}$

The word 'Chāturmāsya' seems to mean a period of three months; for according to the authors of ritualistic manuals a sacrificial priest has to perform every year four Chāturmāsya rites, such as 'Vaiśvadeva,' 'Sākamedha,' 'Varuṇapraghāsa,' and 'Śunāsīrīya,' one after another. Now the number of luni-solar intercalary months in 1,040 solar years is 390. Dividing this period into minor periods of three months each, we have $390 \div 3 = 130$ Chāturmāsyas. But Mahīdhara counts it as 126, while Bhaṭṭabhāskara makes it 135.

Now Mahīdhara seems to have arrived at these numbers not by calculating independently in the way I have pointed out, but by simply counting the animals enumerated in the White Yajurveda. It is, therefore, clear that these numbers are not those of Mahīdhara, but of the person or persons who arranged the reading of the Veda. Now the interval between the redactor and Mahīdhara is admitted to be more than a thousand years. It is likely that in this long interval of time mistakes, such as reading a few animals of one set along with those of the previous set and *vice versa*, might have been com-

mitted. Therefore it is a matter for surprise that, in spite of such various sources of error, the numbers deviate so slightly from the truth. Now the question that arises is whether these numbers are the inventions of a theological brain, a mythological brain, or an astronomical brain. Almost all the mediæval commentators regard these numbers as mysterious inventions of a divine author. Modern critics seem to look upon them as magical numbers based upon some superstitious ideas. No doubt the meaning of words may be missed, sentences may be misinterpreted, and the intentions of ancient authors may be so far forgotten as to impute to them ideas which they never entertained. All this is possible and it has frequently happened in interpreting ancient authors. But numbers cannot be misunderstood. They can have only one kind of meaning, if they have any meaning at all. That ancient authors had some decided meaning in using numbers, can admit of no question. Then, if there is any meaning at all, as there must be some meaning in the above numbers, it can be no other than the signification of intercalary days and months as pointed out above. Also there can be no doubt whatever that the various sacrificial animals were picture-signs indicating days, weeks, months, and years. By the repetition and combination of these signs, the Vedic poets seem to have kept their calendar as we do ours by repetition and combination of numerical signs. On this hypothesis, we can explain a number of Vedic stories which are otherwise inexplicable. The story, for example of Vishṇu in the form of a boar diving into the sea and bringing back the earth submerged therein and spreading it broader, seems to allude to the fact of the adjustment of some difference between calculated and observed lunations both by adding a few days more to the earth, *i. e.* the third year of a cycle, thereby making it broader, and also by taking back the intercalary day called Vishṇu of the sea, *i. e.* the fourth year, to the day denoted by the boar sign, instead of postponing it to some remote

day. Likewise the story of Vishṇu in the form of a fish diving into the sea and recovering the stolen Vedas seems to allude to the fact of the adjustment of some days, as denoted by the syllables of the Veda, by putting the intercalary day on the day, denoted by the fish-sign. Similarly the story of Tittiri, or partridge, birds swallowing the Vedas disgorged by Yājnyavalkya, seems to allude to the fact of adding as many syllables to the Veda as the number of days of postponement of the intercalary day to the day signified by the partridge sign instead of leaving out those days as was done by Yājnyavalkya. The fish and partridge appear in the list of sacrificial animals enumerated in the Yajurveda [1] Among the Aztecs, too, "the days had delightful names such as 'Sea animal,' 'Small bird,' 'Monkey,' 'Rain'; not recurring every week, but different for the twenty different days of the month. The cardinal points were named 'Reed,' 'House,' 'Flint,' 'Rabbit,' for east, west, north, and south. Thus an Aztec might say, 'I am going house on Sea-animal,' which would merely mean that he was starting for the west on Monday".[2] Mr. Susan Hale, the author of the '*Story of Mexico*' from which the above passage is quoted, might have rightly added, "but this would imply a theological or mythological legend to those who take the words 'house' and 'Sea-animal' in their literal sense."

The other epoch-making sacrifices are those performed at the close of nine and ten months. That these months are not ordinary months, but such as were made up of 270 and 300 intercalary days, corresponding to 1,080 and 1,200 solar years, needs no repetition. They are thus referred to in the Ṛigveda (III, 39, 1):—

"The praise that is prompted by the heart, and is uttered by the reciters of sacred hymns, proceeds to the

[1] See *Vājasaneyi Saṁhita*, XXIV, 1—26.

[2] P. 117, *Story of Mexico*.

presence of the lord, and is his awakener when repeated at the sacrifice: be cognizant, Indra, of this praise, which is born for thee.

"That praise which is begotten before (the dawn) of day is the awakener of Indra, when repeated at the (morning) sacrifice: auspicious and clothed in white raiment is this our ancient and paternal hymn.

"The parent of twins (the dawn) has brought forth the twin (Aświns) on this occasion, (in the praise of whom) the tip of my tongue remains tremulous: they two, the dispersers of darkness, combine, assuming bodies as a pair (of twins) at the origin of the day.

"A friend, accompanied by the faithful friends who had celebrated the nine months' rite, and tracking the cows upon his knees, and in like manner accompanied by those ten, who had accomplished the ten months' rite, Indra made manifest the true light of the sun (Satya), theretofore dwelling in the darkness (of the cave").

"Indra discovered the sweet milk, secreted in the milch-cow, and thereupon, brought forth (from their concealment) the herd of cattle having feet and having hoofs: munificent in gifts, he held in his right hand that which had been hidden in the cavern which was concealed in the waters."

"The observers of the nine months' celebration, those of the ten months, pouring out libations, worship Indra with hymns: the leaders (of rites), glorifying him, have set open the cave (concealing the cattle"). R.V.V, 29, 12.

"At this sacrifice the stone (set in motion) by the hands (of the priests) makes a noise, whereby the nine-month-ministrants celebrated the ten months' worship: when Saramā going to the ceremony discovered the cattle, and Angiras rendered all the rights effective." V, 45, 7.

"May Sūrya, lord of seven steeds, arrive: for he has a distant goal (to reach) by a tedious route: fleet as

a hawk he pounces upon the offered (sacrificial) food: ever young and far-seeing, he shines, moving amidst rays of light." V, 45, 8.

" As the wind ruffles the lake on every side, so may thy womb be stimulated, and the conception of the months come forth." V, 78, 7.

" As the wind, as the wood, as the ocean are agitated, so do thou, gestation of ten months, invested with the uterine membranes, descend."

" May the boy (Kumāra) who has reposed for ten months in the bosom of his mother come forth alive, unharmed, living, from a living parent." V. 78, 9.

The three verses (III, 39, 1-3) refer to the fact of composing new verses on the intercalary day into whose form the partial night and day, the twin pair, have transformed themselves at the origin of the day. The verse (III, 39, 5) refers to the belief that departed souls live upon the moon in the dark-half of the month. Accordingly this verse means that Indra, the sun, on the intercalary day in company with the departed ancestors,who performed the nine months' rite, as well as with those, who performed the ten months' sacrifice, has appeared in the east drinking the nectar of the moon on the new moon day of the Satya year, thereby making another intercalary day. The word ' Satya,' which is synonymous with the word ' Kṛitayuga,' is to be noticed here. The phrase ' making manifest what was dwelling in the darkness of the cave' is in allusion to the formation of an intercalary day from three quarters hidden, as it were, in a cave. The phrase—' whereby the nine months' ministrants celebrated the ten months' rite'—in verse V, 45, 7 should not be considered as implying the presence of the same priests on both the occasions; for it may refer to the priests of the same family, or like verse III, 39, 5, it may refer to the departed ancestors seated in the moon and bringing the intercalary day. In verse V, 45, 8, the intercalary day

is described as a hawk. The three verses V, 78, 7-9 are now-a-days usually recited on the occasion of child-birth. But there is abundant reason to believe that the original intention of the authors of this hymn was not such. The boy (Kumāra) in the last verse is not a human boy, as he might appear to be. It has already been pointed out how the three quarter days of three consecutive solar years prior to the fourth year of a cycle are termed the 'mutilated boy' and the intercalary day itself the develop-ed child running away. It is this boy that is referred to in the above passage. In the Aitareya Brāhmaṇa, the whole of the 27th and 29th sections, Chapter 5, Book VI, is devoted to the description of this boy. These, like many other sections of the Brāhmaṇa, appear mystical and entirely incomprehensible. But when it is known that the Vedic poets calculated the days by the number of the syllables of the prayers they composed, and called the intercalary day by such names as 'prajāpati,' 'the boy,' 'the cow,' 'the golden bird,' many of the sections of the Brāhmaṇa become intelligible. These sections refer to the recitation by the Hotṛi priest of the 'Nābhānedishṭha' and the Nārāśamsa hymns:—

"They repeat the Śilpas (hymns for producing wonderful pieces of art). They are such wonder works of the gods, and the arts in this world are to be understood as an imitation thereof. The gilded cloth spread over an elephant, the carriage to which a mule is yoked are such a wonder work. This work is understood in this world by him who has such a knowledge. The Śilpas make ready the soul, and imbue it with the knowledge of the sacred hymns. By means of them, the Hotṛi priest prepares the soul for the sacrificer. He repeats the Nābhānedishṭha[1] hymn (one of the Śilpas). For Nābhā-nedishṭha is the sperm. In such a way he (the priest) effuses the sperm. He praises him (Nābhānedishṭha) without

[1] Nābhānedishtha is one of the sons of Manu, from whom the Kali era, now of 5,008 years, is counted.

mentioning his name. For the semen is like something unspeakable, secretly poured forth into the womb. The sperm becomes blended. For Prajāpati had carnal intercourse with his daughter, his sperm was poured forth upon the earth (and was mixed with it). This was done for making the sperm produce fruit. He then repeats the Nārāśamsa: for 'Narāḥ' means offspring and 'Śamsaḥ' 'speech'. In this way he (the priest) places speech into children (when they are born). Hence children are born endowed with the faculty of speech ...... The Hotṛi, having effused the sacrificer in the shape of sperm (symbolically), gives him up to the Maitrāvaruṇa priest, saying 'form his breaths ....' (section 29). The Brāhmaṇācchamsi priest repeats the Sukīrti hymn for the Sukīrti is the womb of the gods. He thus causes the sacrificer to be born out of the sacrifice, which is the womb of the gods. He repeats the Vṛishākapi hymn, for Vṛishākapi is the soul. In this way he makes the soul of the sacrificer. He repeats it with Nyūnkha.[1] The Nyūnkha is the food. In this he provides him when born with food, just as the mother gives breast to her child. That hymn is in the Pankti (*i.e.* five-fold) metre; for the man consists of five parts—hair, skin, flesh, bones and marrow. He prepares the sacrificer just in the same way as man in general is prepared. The Brāhmaṇācchamsi, after having created the sacrificer, hands him over to Acchāvāka (the well-speaking priest) saying, 'make a footing for him'."

Nābhānedishtḥa is the son of Vaivasvata Manu, from whom the era of Kaliyuga, now of 5,008 years, is still being counted. The wonderful pieces of art attributed to him are no other than the symbolical creation by means of the syllables of special Ṛik verses of the ten months' old child, Prajâpati, the lord of the year, the great sacrificer. "Accordingly," says Prof. Eggeling in his Introduction to

[1] Nyūnkha is here the utterance of the sound 'i' sixteen times, with three moras and thirteen times with half moras.

the Śatapatha Brāhmaṇa, "the Stomas (hymn forms) of of the single chanted verses composing the hymn of praise on the one hand, and the verses and metres of the recited litany on the other, are so arranged and explained as to make up the different parts of a bird's body. It need scarcely be remarked that whilst in the case of the altar the task of bringing out at least a rough resemblance to a flying bird offered no great difficulties, it is altogether beyond the capabilities of vocal performances, such as the chant and the recitation of hymns and detached verses. But the very fact that this symbolism is only a matter of definition and make-believe makes it all the more characteristic of the great hold which the Prajāpati theory had gained upon the sacerdotal mind."[1] Prof. Eggeling paid no attention to the calculation, by a set of syllables of the great litany, of the days of the 'Cows' Walk' during which Prajāpati is believed to have grown limb after limb. As Nābhānedishtha is the inventor of the scheme of calculating the year or the growth of Prajāpati by means of sets of syllables representing intercalary days, he is called here the sperm, productive of Prajāpati, the era. The intercalary day is elsewhere described as a bull marrying its own sisters, mothers and daughters, the three quarter days. Similarly Prajāpati is here described as having married his own daughter, the quarter night or day, and produced such offsprings as are Nārāśamsa, speakable by men; for the three quarter days are, as shown above in the words of the Ṛigveda and Atharvaveda, inexpressible, and only the fourth, *i.e.* the intercalary day itself can be expressed by representing it by a complete and expressible syllable. When the intercalary days accumulated to the extent of 10 months, they were regarded not as 300 children, but as a single child come out of the womb of the pregnant year at the expiration of ten months, during which the five parts of the child's body had fully developed. It is this child

[1] Vol. IV, P. xxvi—xxvii.

which is provided by the priests with soul, breath, food and the five parts. It is this child which the well-speaking priest is called upon to extol and keep in a reserved place. Thus it is clear that the boy spoken of in the verse of the Ṛigveda is the very child of the Aitareya Brāhmaṇa. As regards the use of the word, Prajāpati, in the sense of the year, the moon, the sun, the cosmic sacrificer, and sacrifice itself, the whole of the Śatapatha Brāhmaṇa may be quoted. Summarising the various meanings, in which the word is used, Prof. Eggeling writes in his Introduction to the Śatapatha[1] Brāhmaṇa as follows :—

"Prajāpati, who here takes the place of the Purusha, the world-man or the all-embracing personality, is offered up anew in every sacrifice; and inasmuch as the very dismemberment of the lord of creatures, which took place at the archetypal sacrifice, was in itself the creation of the universe. So every sacrifice is also a repetition of that first creative act. Thus the periodic sacrifice is nothing else than a micro-cosmic representation of the ever-proceeding destruction and renewal of all cosmic life and matter. The theologians of the Brāhmaṇas go, however, one important step further by identifying the performer or patron of the sacrifice—the sacrificer with Prajāpati; and it is this identification which may perhaps, furnish us with a clue to the reason why the authors of the Brāhmaṇas came to fix upon Prajāpati as the name of the Supreme Spirit.

"By offering up his own self in sacrifice, Prajāpati becomes dismembered; and all those separated limbs and faculties of his come to form the universe,—all that exists from the gods and Asuras (children of the father, Prajāpati) down to the worm, the blade of grass and smallest particle of inert matter. It requires a new, and ever new, sacrifice to *build the dismembered lord of creatures up again and*

[1] Vol. IV, P. xv, *Ibid.*

restore him so as to enable him to offer himself up again and again and renew the universe and thus keep up the uninterrupted revolution of time and matter. *The idea of the dismembered Prajāpati, and of this or that sacrificial act being required to complete and replenish him, occurs throughout the lucubrations of the Brāhmaṇas.* But in the exposition of the ordinary forms of sacrifice this element can hardly be considered as one of vital importance, whilst *in the Agnichayana it is, on the contrary, the very essence of the whole performance.*"

While Prof. Eggeling has thus comprehended the full spirit of the Brāhmaṇas so far as the destruction and renewal of matter is concerned, it is surprising to find his failure to understand the exact nature of what he calls 'the periodical dismemberment and renewal of Prajāpati as time.' What is that period during which he remains dismembered again and again? And what is the period when his renewal or restoration is celebrated by a sacrificial act? *The answer is, as often repeated, that he as Father Time, remains dismembered for three years and attains restoration in the fourth year of every cycle.* It follows, therefore, that Prajāpati is a name of the intercalary day. Hence ten months of Prajāpati must necessarily mean 300 intercalary days equivalent to 1,200 solar years.—

Like the ten months' sacrifice, the Agnichayana, or the construction of the great fire-altar, is also an epoch-making sacrifice. The latter was celebrated on the 360th intercalary day, *i.* . the last day of the twelve months' 'Cows' Walk.' The fire-altar is an essential element of each Atirātra or intercalary day sacrifice. In a note on page 368, in his translation of the Aitareya Brāhmaṇa, Prof. Haug says :—

" At each Atirātra of the Gavām Ayana, the so-called Chayana ceremony takes place. This consists in the construction of the Uttara Vedi (the northern altar) in the shape of an eagle. About 1,440 bricks are required for

the structure, each consecrated with a separate Yajur Mantra. This altar represents the universe. A tortoise is buried alive under it and a living frog carried round it and afterwards turned out. The fire kindled on this new altar is the Agni Chitya. To him are the oblations of flesh and Soma to be given."

Of course, Prof. Haug did not know that an Atirātra meant an intercalary day. All that he knew from his study of the Brāhmaṇas and the Ritualistic manuals was that the Gavām Ayana was made up of the Atirātras and the Fire-altar was indispensable for the sacrifice performed on each of the Atirātras constituting the 'Cows' Walk.' Hence it follows that the Fire-altar constructed on the 360th day of the 'Cows' Walk' was not a new thing. But it was only made grand in proportion to the magnitude of the time it had to represent. Prof. Eggeling in his introduction to the Śatapatha Brāhmaṇa says[1] :—

"This performance (of the Agnichayana) assuredly belongs to Prajāpati, for it is Prajāpati he undertakes to construct by this performance."—"Once[2] granted that the real purpose of all sacrificial performances is the restoration of the dismembered lord of creatures, and the reconstruction of all, it cannot be denied that of all ceremonial observances, the building of the Fire-altar was the one most admirably adopted for this grand symbolic performance. The very magnitude of the structure,—nay, its practically illimitable extent, coupled with the immense number of single objects—mostly bricks of various kinds, of which it is composed, cannot but offer sufficiently favourable conditions for contriving what might fairly pass for a miniature representation of at least the visible universe."—"He[3] (Prajāpati) springs from the Cos-

[1] Vol. IV, P, XVIII, Footnote 1.

[2] P, XIX, *Ibid.*

[3] See P. XX and XXI, Eggeling's Introduction to the *Satapatha Brah. Vol. IV.*

mic Waters,[1] and hence a lotus leaf is placed at the bottom of the Fire-altar to represent the waters and the womb from which Agniprajāpati and the human sacrificer are born. Prajāpati is the sacrifice and the food of the gods; and Soma, the drink of immortality and at the same time the moon, is the divine food or offering, the Uttamam Havis. Hence Prajāpati is Soma." "It[2] is not, however, only with the moon amongst the heavenly luminaries that Prajāpati is identified, but also with the sun; for the latter, as we have seen, is but one of the three forms of Agni and the fire on the great altar is itself the sun; whilst the notion of the sun being fashioned like a bird flying through space is not unfamiliar to the poets of the Vedic age. As the personified totality of all being, Prajāpati, however, not only represents the phenomena and aspects of space, but also those of time—he is Father Time. But, just as in the material process of building up the Fire-altar, the infinite dimensions of space require to be reduced to finite proportions, so in regard to time, the year as the lowest complete revolution of time, is taken to represent the Lord of Creation—he is Father Year."

The great[3] Fire-altar consisting of five chief layers is constructed in the form of a bird, the body of which is made in the form of a square measuring thirty feet on each side. After the ground of the body has been ploughed, watered, and sown with seeds of all kinds of herbs, a square mound, called Uttara Vedi, measuring seven feet on each side, is raised in the middle of the square body, and the whole of the latter then made level with it. In the centre of the body thus raised, the priest puts down a lotus leaf and thereupon a gold plate, which has twenty-one points carved on it and which the priest

[1] Water is a name of the fourth year of every cycle as among the Aztecs.

[2] P. XXII—XXIII, *Ibid.*

[3] See for fuller details Eggeling's Translation of the *Satapatha Brahmna*, Vol. III, and IV.

has been wearing during the time of initiation. On this plate a small human figure of gold representing Agni-prajāpati is then laid with its head towards the east. Two offering-spoons filled with ghee and sour curds are then placed, one on each side of this figure. Upon this man and round it, brick after brick, named variously and consecrated with different Yajurvedic formulas is placed, and a circular layer requiring about 1,950 bricks is constructed and covered wi h loose soil. Almost similarly the second, the third, and the fourth layers are built up with the same number of bricks and covered with loose soil. Thereupon the fifth layer together with some special hearths is constructed, using about 3,000 bricks, and is likewise covered with loose soil. It is upon this altar and the special hearths built of 10,800 bricks on the whole that the sacred fire is kindled. The whole of this sacrificial performance is then conducted with as much precision as the solution of arithmetical problems. The number of prescribed offerings and of the syllables of prayers recited are carefully watched over. Any commission[1] or omission in the sacrificial details is made good by special expiatory rites. The whole of the fourth Kāṇḍa of the Black Yajurveda and a number of chapters (XII-XV) of the White Yajurveda are taken up with the description of the Fire-altar and the rites connected with it. It is unnecessary to enter into all those details here. It would be enough to know what these bricks are meant to represent and what the exact number, 10,800, means in particular. With reference to the symbolical meaning of the bricks, the Śatapatha Brāhmaṇa says :—(X, 4, 2, 27).

"Whenever he laid down an enclosing stone (Parisṛits) he laid down a night, and along with that fifteen *muhūrtas*,and along with the *muhūrtas* fifteen eighties(of syllables

[1] The Panchavimsa Brāhmana (IX, 3, 11) prescribes the recitation of a Svarasāman in case the Udgātri priests have previously committed an excess in their chanting.

of the sacred texts). And whenever he laid down a brick with a formula (*Yajushmati*), he laid down a day, and along with that fifteen *muhūrtas*, and along with the *muhūrtas* fifteen eighties (of syllables)."

What we have to understand here is the distinction which the author of the Brāhmaṇa makes between bricks in general and bricks with special formulas consecrating them. The consecrated bricks, called here Parisṛits or enclosing stones, are 360 in number, while the bricks in general, inclusive of the above, are 10,800. Prof. Eggeling says in a note on this passage:—

"The number[1] of Parisṛits by which the great altar is enclosed is only 261; but these are usually added to those of the other brick-built hearths, *viz*—the Gārhapatya (21) and the eight Dhishṇyas (78),—the whole amounting to 360 enclosing stones, or one for each day (or night) in the year."

It is clear, therefore, that the special bricks are meant to represent the 360 days, while the bricks in general are intended to signify the exact number of the *muhūrtas* of the period of these 360 days; for 360 × 30 (the number of *muhūrtas* in a day) is equal 10,800, which is the number of the bricks composing the altar in question. Accordingly the Śatapatha Brāhmaṇa says (X, 4, 2, 20):—"In the year these *muhūrtas* amounted to ten thousand and eight hundred: he (Prajāpati) stopped at the ten thousand and eight hundred." It may appear from the above passage that these three hundred and sixty days are the days of an ordinary civil year and that the Vedic poets and the authors of the Brāhmaṇas used to perform their 'Cows' Walk' sacrifice year after year by constructing such a huge altar. But, as has been repeatedly pointed out, these days are those of the 'Cows' Walk' gained by the frequently dismembered and restored Prajāpati at the rate of 7½ *muhūrtas* or 6

[1] P. 354, Vol, IV, *Sata. Br.*

hours per year, or of one day in every cycle of four years. The Aitareya[1] Brāhmaṇa, however, restricts the number of bricks to 1,440 and regards them as gained by 720 mornings and 720 evenings: "The Agnihotṛi has to perform during the year 720 evening offerings and also 720 morning offerings, just as many bricks (1,440) marked by sacrificial formulas as are required in the Gavām Ayana. He, who with such a knowledge brings the Agnihotram, has the sacrifice performed with a Sattra (sacrificial session) lasting all the year and with Agnichitya, the hearth constructed at the Chayana ceremony."

The year during which the sacrificer is asked to offer 720 morning offerings and 720 evening offerings can by no means be an ordinary year; for no ordinary year of 360 days consists of 720 mornings and 720 evenings, affording thereby an opportunity to perform 1,440 offerings. These 720 mornings and 720 evenings must necessarily be the 720 times six hours falling during the day time and another 720 times six hours falling during the night time in the period of 1440 years of 365¼ days each. As the day of the Vedic poets began with the evening and ended with the next evening, the first year of their cycle of four years of 365¼ days must necessarily close at mid-night, the second year in the morning, the third year at mid-day, and the fourth year in the evening. The Vedic poets seem to have considered it improper to allow the partial days to pass by without an offering, while each of the 365 complete days had its usual offerings, one in the morning and another in the evening. So to the two partial days of 6 hours, which closed the year at mid-night and in the evening, they seem to have made two special evening offerings; and to those which brought the year to a close in the morning and at mid-day, two special morning offerings, inasmuch as no offerings were made at mid-night or at mid-day. Thus in the course of 1,440 years the special morning

[1] V, 28, *Aitareya. Br.*

offerings would amount to 720 and the evening offerings also to 720. It is this fact to which the author of the Aitareya seems to allude. The sacrificer commemorating the 'Cows' Walk' of 360 days is called upon to make these 1,440 offerings and to construct an altar with 1,440 bricks, not because he has any personal experience of all these 720 morning and 720 evening offerings, but because he possesses the knowledge of so many offerings gradually made in the past. Whoever performed this sacrifice in virtue of his knowledge of the number of years that had passed by was considered as having observed the sacrificial session of 360 intercalary days of the 'Cows' Walk' and as having carried the fire for one intercalary year of 360 days or 1,440 years.

The 'Eighties of syllables' spoken of in the passage of the Śatapatha Brāhmaṇa quoted above refers to the Great Litany, in which every set of eighty syllables is, as will be seen, made to represent one day, *i.e.* the intercalary day. Accordingly the Great Litany of hymns seems to have been so arranged as to consist of 360 sets of eighty syllables each, corresponding to the 360 days and 360 special bricks of the altar of the day. The number of bricks as well as the number of the sets of eighty syllables each in the Great Litany seem to have been increasing in proportion to the increase in the number of intercalary days. Accordingly we find a reference in the Śatapatha Brāhmaṇa (X, 4, 3, 19) to an altar constructed of 395 special bricks:—

"All these make three hundred and ninety-five. Of these, three hundred and sixty, supplying the place of days, are made the means of gaining the days, they are the counterpart of the days: there are three hundred and sixty of them, for there are three hundred and sixty days in the year. And for the thirty six (additional days) which there are, the filling of the earth (counts as) the thirty sixth; and twenty-four thereof, supplying the place

of half-moons, are made the (means of) gaining the half-moons; they are the counterpart of the half-moons. And the remaining twelve, supplying the place of months, they are the counterpart of the months. And lest the seasons should be wanting, these (bricks) by two and two (taken) together, supply the place of seasons."

What the passage means is this:—the bricks together with the layer of the earth with which they are covered amount to 396 in number. Of these, 360 bricks representing 360 days go to form the year. Of the remaining 36 days, 24 days end with half-months. We know that the difference between four lunar and four tropical years amounts to 45 days, *i.e.* a month and a half. Likewise the difference between 8 lunar and solar years amounts to 90 days or 3 months; similarly the difference between 12 lunar and solar years amounts to 135 days, or four months and a half. In other words, in three consecutive cycles of four years each, two cycles end with half-months, and one cycle with full months. Accordingly, out of the thirty-six cycles corresponding to the thirty-six intercalary days, twenty-four cycles end with half-months and twelve cycles with full-months. Generalising this fact, the author of the Brāhmaṇa goes on to say that all these bricks, when taken by two and two together, give full months, the odd numbers yielding half-months; in other words, every second cycle ends in complete intercalary months, the rest ending with half-months. This is what the author must necessarily have meant in this passage, if he meant anything at all. But at the suggestion of Prof. Weber, Prof. Eggeling took this passage as a reference to a cycle of six civil-sidereal years with an intercalary month of 36 days added to the sixth civil year in order to adjust it with siderial years of 366 days each. I need not say that under this interpretation of the passage there can be no explanation whatever of 'gaining the half-moons and months.' What, however, led Prof. Weber to construe these and other passages in this way,

we shall see later on. Reverting to the question under consideration, it is, however, clear that the number of special bricks employed to construct an altar, cycle after cycle, was increased in proportion to the increase in the number of intercalary days. But it is more than probable that after the intercalary year was over, the succeeding cyclic sacrifices were performed with a fire-altar constructed on a small scale; for it is not possible to construct squares and circles fitted to hold the regularly increasing number of bricks, both special and general, in the ratio of 360 to 10,800. This is the ratio of special to general bricks that is adopted in the case of the great Fire-altar. The geometrical problems connected with this Fire-altar must necessarily have given a lot of trouble to a number of thinkers of the day in arranging the squares and circles, so as to fittingly hold the required number of bricks. Hence the succeeding sacrifices conducted on a small scale must have appeared quite insignificant, when compared with this epoch-making sacrifice with its pile of bricks beautifully and symmetrically arranged. A desire to perform such a grand sacrifice for a second and a third time may have originated among a few wealthy persons who alone could afford to undertake it. But there was an unavoidable difficulty. The epoch which this sacrifice was meant to mark had long passed away. The number of intercalary days had increased, causing a proportional increase in the number of required syllables of the Great Litany. As the number of bricks employed to build the altar and the number of verses to be chanted had to correspond somehow or other to the number of years and days elapsed, the repetition of a past sacrifice at a later time was incongruous. It was impossible that persons interested in undertaking this or a similar grand sacrifice could be so fortunate as to see the arrival of another epoch of 1,440 years. Hence the only alternative left for them was to undertake the same sacrifice as an imitation. The Śata-

patha Brāhmaṇa (IX, 5, 1, 62—65) records a heated discussion as to the propriety of performing the same Agnichayana Sacrifice again, and permits its performance as an imitation on the authority of Śāndilyāyana.

" And, indeed, he who carries about Agni becomes pregnant with all beings and with all the Gods; and he who builds him when he has not been carried about for a year kills all beings in the form of an embryo. But, surely, he who kills an human embryo is despised, how much more then he who kills him (Agni), for he is a God. ' Let no one become an officiating priest for an (Agni) who has not been carried about for a year,' said Vātsya, ' lest he should be a participator in the killing of this, a god's seed!' ' A six-month (Agni) is the last he may build,' they say, ' for six-month embryos are the last that live when born.' If he were to recite the Great Litany on one not carried for a year, he should recite (only) the eighties of verses; for something incomplete is (the Agni) not carried for a year, and something incomplete are the eighties of verses. But, indeed, he would only still further pull asunder that (Agni, already) pulled asunder; and, indeed, whether he (Agni) be carried for a year, or not carried for a year, he (the Hotṛi) should recite the whole of the Great Litany. Now Śāndilyāyana was once upon a time sojourning in the eastern region. Daiyāmpati said to him, ' Śāndilyāyana, how is Agni to be built ? For, indeed, we are loth to carry him for a year, and yet we wish to build him.' [1] He said, ' Let *him* by all means build him (Agni) *because* he (Agni) has previously been carried for a year; for that (Agni) alone he builds as one that has been carried (as a child in the womb).' "

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[1] " Sa hovācha—kāmam vai enam sa chinvīta,
Yena purâ samvatsaram bhritassyât tam hyeva tam bhritam santan cinute iti. "

Prof. Eggeling has taken '*yena*' as a relative pronoun qualifying ' him ' (any sacrificer); and his translation is :—' Let him by whom he

All these passages refer to a heated discussion as to whether a great fire-altar, similar to the one constructed on the 360th day of the 'Cows' Walk' in the past may be built again, using the same number of bricks, and reciting the same number of verses of the Great Litany. Vātsya, one of the teachers, holds that unless Agni has again been carried about for a year, *i.e.* has again attained 360 days equivalent to 1,440 years, he cannot be built in the same fashion; for it would be bringing out the child before it was fully developed and thereby committing infanticide. It is necessary, the same teacher continues, to allow Agni to grow at least for six months (720 years), for a child born after six months can live. In this case, the bricks and the sets of eighty syllables should, however, be so arranged as to correspond with the age of Agni. But, on the other hand, Śāndilyāyana holds that the same child, Agni, that has once been carried about for a year and built on its 360th day may be rebuilt as an imitation of past performance; for it is no sin to build the one that has already been built and observe all the details of the rite in connection therewith. It is this opinion of Śāndilyāyana that seems to have been followed by almost all the Brāhmans of the time and to have led to the construction of this Great Fire-altar again and again, a number of times at the will and pleasure of any sacrificer This meaningless repetition of what was once performed as an epoch-making sacrifice must have certainly made it lose all its significance and assume the lifeless form which

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has been carried for a year build him (Agni).' According to this rendering, Sāndilyāyana's answer would not meet the question at all; for the question was whether a priest who had not carried Agni for a year would be justified in building it, as if it had been carried for a year? But if we take *yena* in the sense 'because,' then the answer would be just what the questioner expected from Sāndilyāyana. The expected answer was permission to build Agni of one year's age without carrying it for a year. According to Sāyana this reply is not intended to restrict the building of the fire-altar to one who carried the fire for a full year, but only to discountenance the building in the case of one who has carried it for a few days.—See Note 4, P. 273. Vol. IV. *Satapatha Brah.*, Eggeling's translation.

it now has. Nay, Śāndilyāyana's opinion seems to have been followed in the case of all other epoch-making sacrifices recorded in the Vedas, with the consequence that like the Agnichayana they, too, have lost their significance and become a mass of mechanical ceremonial operations. It is this meaningless repetition of past sacrifices that has made the mediæval commentators to look upon them as rites to be observed at all costs by the Twice-born class without caring to inquire into their meaning. It is owing to this repetition, that a number of acts and words have entirely lost their original meaning. The command to carry about the child Agni, for example, which originally prescribed the counting of the age of Agni in terms of intercalary days, was construed to mean the carrying about the fire in a fire-pan suspended in a sling from his own neck by an intending sacrificer for at least part of each day during a fixed number of days. Likewise the words, 'Gavām Ayana,' 'Cows' Walk' and others have, as I already pointed out, become dead names, rendering the ideas connected with them fantastic and unintelligible.

CHAPTER VII.

Strings of Years

Apart from the epoch-making sacrifices, in the formulas, of which the Vedic poets have ineffaceably preserved a record of the years they counted from the time of Manu, there are also other schemes invented by them for the purpose of easily finding out the number of years elapsed since the commencement of their reckoning. These are certain hymns which, either by the words or formulas they contain or by the number of syllables in their verses, are meant to denote the number of intercalary days or of the cycles of four years, each counted from the beginning. These hymns must, therefore, have been receiving additions of formulas upon formulas or verses upon verses in proportion to the increase in the number of intercalary days. These hymns are: (1) the Mahāvrata Sāman, (2) the Vasordhārā, (3) the Śatarudrīya, and (4) the Mahaduktha. Of these, the Mahāvrata Sāman consists of a number of Ṛik verses set to a musical chant for recitation by Sāma-singers on the last day of sacrifices. The arrangement of the verses and their recitation are so made as to represent the growth of the bird-like Agni-prajāpati, limb after limb and organ after organ, into a child of 360 intercalary days and upwards. In Note 5, p. 282, Vol. IV of the Śatapatha Brāhmaṇa, Prof. Eggeling says:—

"The central feature of the Mahāvrata consists in the chanting at the mid-day service—as the Hotṛi's Pṛishṭha Stotra—of the so-called Mahāvrata-sāman. It consists of five different parts which, like those of which the Mahad Uktham, recited after it, is composed,—are

considered as representing different parts of Agniprajāpati's body, *i.e.* 1. Gāyatra-Sāman, representing the head; 2. Rathantara-Sāman, representing the right wing; 3. Brihat-Sāman, the left wing; Bhadra-Sāman, the tail. The chanting is followed by certain ceremonies—buckling armour on a nobleman, driving in a sun-wise direction round the sacrificial ground, shooting arrows at two ox-hides, beating of drums, &c.—apparently symbolising the driving off of evil spirits from the sacrifice, or a combat for the possession of (the light of) the sun." Again in Note 2, p. 288 of the same volume, he says:—"According to the ritual symbolism, these preliminary Sāmans are intended to supply the newly completed Prajāpati with hair (feathers) and nails; but the performance would rather seem to be a solemn mode of doing homage to the different parts of the bird-like altar and the sacrificial ground." The recitation is "performed in the following order: (1) near the head of the altar, he sings the Prāṇa, 'breath,' (Sāmaveda, Vol. II, p. 436); (2) near the tail the Apāna, 'downward-breathing', (II, p. 437); (3) and (4) near the right and left wing, the two Vratapakshau (II, p. 438); (5) near the left arm-pit the Prajāpati-hṛidaya, 'heart of Prajāpati', (II, p. 499); (6) near the Chātwāla or pit, the Vāsishṭhanihava (Vol. V, p. 602); (7) near the Agnīdhra hearth the Satrasyarddhi 'success of the sacrificial session', (II, p. 465); (8) and (9) in front and behind the Havirdhāna carts, the śloka and anuśloka (I, pp. 887-9); (10) towards the Mārjālīya, the Yama (II, p. 461); (11) and (13) in front and behind the Sadas, the Āyus, and Navastobha (II, pp. 450-451); (13) in front of the Gārhapatya the Ṛiśyasya Sāman (II, p. 324)."

Thus it is plain that the purpose of Sāma-singing was merely to represent the growth of the bird-like Prajāpati, while mechanical calculation was made by special verses of the Ṛigveda and the Yajurveda. Hence we may leave out the Mahāvrata Sāman and take into consideration the other three Litanies.

The 'Vasordhārā,' [1] or 'shower of wealth', consists of 401 formulas repeated on the occasion of anointing a king during the performance of sacrifices. In Note 4, p. 213, Vol. IV Śatapatha Brāhmaṇa, Prof. Eggeling says:—"It is the consecration ceremony, in which the King is sprinkled with sacred water, or, so to speak, anointed. The 'Vasordhārā,' or 'shower of wealth,' consisting of an uninterrupted series of 401 libations to Agni (through which all the powers of the god are to be secured to the sacrificer), is intended as the equivalent of that ceremony for the consecration of Agni as king; and, indeed, as a kind of superior consecration ceremony for the royal sacrificer himself, more potent than the Rājasūya and Vājapeya." The word, 'Vasu,' is here used in the sense of both 'wealth' and 'fire.' The Śatapatha Brāhmaṇa (IX, 3, 2, 2) says, "The whole Agni has now been completed, and he is here the Vasu (good one): to that Vasu the gods offered this shower, whence he is called 'shower of wealth'; and in like manner, the sacrificer offers to him this shower and gratifies him thereby." Agni and wealth are, as already shown, two of the many names of the intercalary day. Hence 'shower of wealth' must necessarily mean series of intercalary days counted in terms of libations. It seems likely that in ancient India it was the custom to instal or consecrate a king or patriarch once at the close of every cycle of four years. Accordingly, the generation of a new fire as the heavenly lord of creatures, the installation of the king as the chief priest and lord of the people, and commemoration of the birth of a new cycle, seem to be the three-fold object of this Litany. Hence by the number of formulas, which it has received into itself, cycle after cycle, this Litany seems to have been intended to signify the number of days of Agniprajāpati, the number of chief priests, and the

[1] *Krishna Yajus.*, IV, 7. and *Vaja. Sam*, XVII, 81—85; and XXXIX, 7.

number of cycles that had elapsed. It is, therefore, clear that the four hundred and one formulas, of which this Litany consists, are equivalent to $4 \times 401 = 1,604$ years.

The Śatapatha Brāhmaṇa (IX, 3, 3, 18) says :—

कथमस्यैषा वसोर्धारा संवत्सरमग्निमाप्नोति । कथं संवत्सरेणाग्निना संपद्यत इति । षष्टिश्च ह वै त्रीणि च शतान्येषा वसोर्धारा षडथ पंचत्रिंशत्ततो यानि षष्टिश्च त्रीणि च शतानि तावंति संवत्सरस्याहानि । तत्संवत्सरस्याहान्याप्नोत्यथ यानि षट् षड्वा ऋतवस्तदृतूनां रात्रीराप्नोति । तदुभयानि संवत्सरस्याहोरात्राण्याप्नोत्यथ यानि पंचत्रिंशत्स त्रयोदशो मासस्स आत्मा ॥

"How does the 'wealth-shower' of his obtain this year, and Agni? How does it correspond to the year, to Agni? Well, this shower of wealth consists of three hundred and sixty, and of other six, and of thirty-five. Now, the three hundred and sixty which there are,—so many being the days in the year,—thereby it obtains the days of the year. And what six there are,—the seasons being six in number—thereby it obtains the nights of the seasons. Thus it obtains the days and nights of the year. And what thirty-five there are, they are the thirteenth month; and that is the body."

The word 'year' in the above passage should not be mistaken for an ordinary year. It is, as often pointed out, the year of 401 intercalary days of the 'Cows' Walk' forming the age of the child, Agniprajāpati. As all ancient nations regarded the last five or six days of the tropical year as evil days, the author calls the six intercalary days over and above the intercalary year by the name 'nights', and adds them to the intercalary year also to make it consist of 366 days, corresponding to the fourth year of 366 days of every cycle. He regards the extra thirty-five intercalary days as constituting a thirteenth month of the intercalary year. All that is implied by

the enigmatical explanation of the author is that by the time the Litany of the 'shower of wealth' was completed, there had elapsed 401 cycles, or 1,604 tropical years.

Like the Vasordhārā, the Śatarudrīya also is used for the purpose of recording the number of intercalary days since elapsed.[1] "This solemn and awful ceremony," says Prof. Eggeling, "consists of 425 oblations to Rudra, representative of the fearful aspects of life and nature, accompanied by appropriate formulas addressed to the various forms of the terrible god and his associates, with a view to appeasing their wrath. These formulas make up a complete Kāṇḍa (XVI) of the Vājasaneyi Samhitā, and constitute a special Upanishad." Ablutions of gods are now usually performed reciting the formulas of this Śatarudrīya hymn with the intention of averting evil and lengthening life. Regarding the significance of the Śatarudrīya, the Śatapatha Brāhmaṇa (IX, 1, 1, 43) says:—

कथमस्यैतच्छतरुद्रीयं संवत्सरमग्निमाप्नोति कथं संवत्सरेणाग्निना संपद्यत इति. षष्टिश्च ह वै त्रीणि च शतान्येतच्छतरुद्रीयमथ त्रिंशदथ पंचत्रिंशत्ततो यानि षष्टिश्च त्रीणि शतानि संवत्सरस्यहानि तत्संवत्सरस्याहान्याप्नोत्यथ यानि त्रिंशत्त्रिंशन्मासस्य रात्रयस्तन्मासस्य रात्रीराप्नोति । तद्भयानि संवत्सरस्याहोरात्राण्याप्नोत्यथ यानि पंचत्रिंशत्स त्रयोदशो माससस आत्मा ॥

"How does this Śatarudrīya of his attain to (conformity with) the year, and Agni? How does it correspond to the year, to Agni? Well, this Śatarudrīya includes three hundred and sixty (formulas); and (other) thirty, and thirty-five. Now as to the three hundred and sixty which there are, so many are the days in the year: thereby it obtains the days in the year. And as to the thirty (formulas) which there are, they are the thirty nights of the month: thereby it obtains the nights of the month:

[1] P. 150, Vol. IV, *Sata. Brah.*, Eggeling's translation.

thus it obtains both the days and nights of the year. And as to the thirty-five (formulas) which there are, they are the thirteenth month, (Agni's) self."

The enigmatical explanation of the number, 425 of Śatarudrīya is so similar to that of the number, 401 of the Vasordhārā that there is no doubt that the purpose which the Śatarudrīya is intended to serve is the same as that which the Vasordhārā is meant to fulfil. The only difference between these two hymns is that, while the Vasordhārā consists of 401 formulas, corresponding to 401 days, the Śatarudrīya contains 425 formulas signifying 425 days. Of the three groups into which the number, 425, is divided, it is really difficult to find out why the author calls the second group a month of 30 nights, and the third a thirteenth month of 35 days. Misled by the words 'year,' and 'thirteenth month' occurring in this and other passages, Prof. Weber took them as referring to a cycle of six civil-sidereal years.[1] Now, a civil year consists of 360 days and a sidereal year, of 366 days. Accordingly six civil years fall short of six sidereal years by 36 days. It is these thirty six days which, in the opinion of Prof. Weber, the author of the Śatapatha Brāhmaṇa took as constituting the thirteenth month, intercalated in every sixth civil year in order to adjust the civil with the sidereal years. But according to the text the thirteenth month is made to consist of 35 instead of 36 days. Prof. Weber passed over this difficulty by pointing out another passage in which a thirteenth month of 36 days is referred to. That passage is as follows—

" But indeed, that Fire-altar also is the year,—the nights are its enclosing stones, and there are three hundred and sixty of these, because there are three hundred and sixty nights in the year; and the days are its Yajushmatī bricks, for there are three hundred and sixty of these, and three hundred and sixty days in the

[1] See Prof. Eggeling's Note 1, p. 167, Vol. IV, *Sata Brah.*

year; and those thirty six bricks which are over are the thirteenth month, the body (of the year and the altar), the half months and months,—(there being) twenty-four half months and twelve months."[1]

Evidently, this passage refers to a Fire-altar made up of 756 bricks, of which 720 were taken to represent the seven hundred and twenty days and nights of the intercalary year and the remaining thirty-six bricks were regarded as representing thirty-six extra intercalary days. I have already pointed out, how out of the thirty-six cycles of four years each, corresponding to 36 intercalary days, twenty four cycles end with halves of luni-solar intercalary months, and twelve cycles with full months. Neglecting to consider this important fact, Prof. Weber confined his attention to what he just wanted, a thirteenth month of 36 days, implying thereby that the author of the Śathapatha Brāhmaṇa, who was driven to the expedient of counting the 'filling of the earth as the thirty-sixth day' (in Śat. Br. X, 4, 3, 19, quoted in the previous Chapter) so far forgot his simple arithmetic in this case as to count only 35 instead of 36 days in the thirteenth month. But the undeniable fact is that the author or rather the authors of the Śatapatha Brāhmaṇa were periodically counting the ever-increasing number of the intercalary days by the number of bricks of their Fire-altars, arranged in some suitable ratio, or by their hymnal formulas or syllables adjusted to the day. Thus, when the number of days was only 360, the number of special bricks was also 360, as in the Great Fire-altar; when it was 395 or 396, the special bricks were also of the same number; when it amounted to 401, the formulas corresponding to them were also of the same number as in the Vasordhārā hymn; and when it increased to 425, the formulas were also increased to the same number as in the Śatarudrīya. There may be

[1] *Satapatha Brah.*, X, 5, 4, 10, Eggeling's translation.

some doubt as to why the total number of formulas was divided into several groups and why these were called by different names. Still there can be no doubt whatever regarding the broad fact that it is the number of intercalary days which the progressive number of bricks or of the hymnal formulas is meant to represent. It is, therefore, clear that the Śatarudrīya is a hymnal string of 425 cycles, or 1,700 tropical years that had elapsed since the commencement of the Vedic era.

While the Vasordhārā and Śatarudrīya hymns are thus intended to signify the lapse of as many cycles as the number of formulas they contain, the *Mahad Uktha*, or the Great Litany is meant to serve the double purpose of offering homage to the different parts of Agniprajāpati or the God of Era, and of signifying the passing away of as many cycles as the sets of eighty syllables each, contained in the Litany. "The Great Litany," says Prof. Eggeling, "begins with seven sets of hymns, and verses meant symbolically to represent certain parts of Agniprajāpati's bird-shaped body which the ceremony (of the Fire-altar) is intended to reconstruct, *viz.*, the trunk, neck, head, roots (sinews) of the wings, and right and left wings, and the tail, between each two of which the so-called Sūdadohas verse (Ṛigveda VIII, 69, 3) meant to represent the vital air pervading the body is inserted, as it also is between (and before) the succeeding parts. In the first place there follow three eighties of triplets (or, 3 sets of 240 verses each) in the Gāyatri, Bṛihatī, and Ushṇiḥ metres respectively. Then comes the Vasā hymn representing the belly, and finally a course of recitations (beginning with Hymn VIII, 40) forming the thighs."[1]

Regarding the function of the Great Litany as a recorder of the years, the Śatapatha Brāhmaṇa says:—

कथमस्यैतच्छतरुद्रीयं महदुक्थमाप्नोति कथं महतो-
क्थेन संपद्यत इति । यान्यमूनि पंचविंशतिर्यजूंष्यभि-

[1] Note 1, p. 112, Vol. IV, *Sata. Brah.*, Eggeling's translation.

तोऽशीतीस्स पंचविंश आत्मा । यत्र वा आत्मा तदेव शिरस्तत्पक्षपुच्छान्यथ या अशीतयस्सैवाशीतीनामाप्तिरशीतिभिर्हि महदुक्थमाख्यायतेऽथ यदूर्ध्वमशीतिभ्यो यदेवादो महत उक्थस्योर्ध्वमशीतिभ्य एतदस्य तदेवमु हास्यैतच्छतरुद्रीयं महदुक्थमाप्नोत्येवं महतोक्थेन संपद्यते ॥

"How does this Śatarudrīya of his attain to (conformity with) the Great Litany? How does it correspond to the Great Litany?[1] Well, those twenty-five formulas which there are on both sides of the eighties, they are the twenty-five-fold body; and where the body (of the altar-bird) is, that (includes) the head, and the wings and tail. And what eighties (of formulas) there are (in the Śatarudrīya) thereby indeed the (corresponding) eighties (of the *Mahad Uktha*) are obtained, for by eighties the Great Litany is recited. And what there is (in the Śatarudrīya) after the eighties that is for him the same as what there, in the Great Litany, is after the eighties; and in this way this Śatrudrīya of his attains to (conformity with) the Great Litany; in this way it corresponds to the Great Litany."[2]

The wording of the passage is as enigmatical as the doctrine it is meant to convey is mystical. The question which the author puts at the outset with the intention of explaining it in the succeeding sentences is whether the number recorded in the Śatarudrīya is the same as that recorded in the Great Litany. In reply to this question the author seems to say that the correspondence is not in the total number, but in the arrangement of the formulas of the Śatarudrīya on the one hand, and of the verses of the Great Litany on the other, so as to form the body of the bird-like Agniprajāpati. Just as the different sets of verses of the Great Litany are so

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[1] *Sata. Brah*, IX, 1, 1, 44.

[2] Compare *Sata. Brah.*, IX, 3, 3, 19, where the Great Litany is compared with the Vasordhārā.

arranged as to form the head, trunk, wings, and tail of the bird-like body, so the formulas can be arranged by sets of twenty five each to form the same body. Just as a formula forms a unit in the Śatarudrīya, so a set of eighty syllables forms a unit in the Great Litany.

From this it is clear that each set of eighty syllables of the Great Litany represents an intercalary day. So if we find out the total number of syllables contained the Great Litany, we can determine the total number of the intercalary days, which the poets counted from the commencement of their era. Regarding the number of syllables in the Litany, Prof. Eggeling says:—"The Great Litany consists of numerous hymns, and detached verses and prose formulas; the whole matter recited being stated to amount to as many syllables as would make up a thousand Bṛihatī verses (of thirty-six syllables each)—or 36,000 syllables in all. From an analysis I have made of the Mahad Uktha (or Bṛihad Uktha, as it is also called) as contained in MS. Ind. Off. 1,729 D., I find it very difficult to check the accuracy of this statement; my own calculation yielding somewhere about 37,200 syllables. By leaving out of account the prose formulas as well as certain repetitions, this gross amount might, however, be reduced to something approximating the stated number of syllables; and indeed, the calculation was probably not meant to be a strictly accurate one."[1]

Now we know for certain that the chief function of the Great Litany was to measure the number of intercalary days. It is, therefore, likely that after growing in bulk to the extent of 36,000 syllables, corresponding to $\frac{36000}{80} = 450$ cycles of four years each, it might have received additions in the form of detached verses and prose formulas consisting of about 1,200 syllables equivalent to $\frac{1,200}{80} = 15$ cycles more. Accordingly, the total

[1] Note 3, p. 110, Vol. IV, *Sata. Brah.*, Eggeling's translation.

number of cycles recorded in the Great Litany amounts to 465, corresponding to 465 × 4 = 1,860 years.

We arrive at almost the same number from consideration of other collateral evidence. We are told in the Kṛishna Yajurveda[1] and the Aitareya Brāhmaṇa that the same 'Cows' (intercalary days) which sat at a sacrificial session of ten months or 300 days continued their sitting for another two months more and rose after securing all the seasons at the close of the (intercalary) year. Besides thus indirectly enumerating 360 intercalary days, the Kṛishṇa Yajurveda[2] regularly counts 49 Atirātras, and the Brāhmaṇas[3] fifty-one more in addition. We know from Sāyaṇa's[4] statement, quoted above, that a sacrificial session consisting of more than a hundred days is called by the name 'Ayana,' 'year' or 'walk,' and that below one hundred days it is termed 'Rātrisattra' or 'Atirātra-Sattra,' 'night-session.' Hence it follows that after the close of one year of intercalary days, the Vedic poets began to count the subsequent cyclic days by the name, 'Atirātra.' It is, therefore, clear that towards the close of the Brāhmaṇic period, the number of intercalary days counted from a certain starting-point amounted to 460, a number which is only less by five than the number found out by calculating the syllables of the Great Litany.

Another convincing evidence establishing the same fact is the traditional account of Manvantaras and Yugas that had passed by. The traditional information about the number of Manvantaras and Yugas that had elapsed is thus recorded by Āryabhaṭa in his famous astronomical treatise known as Āryabhatīya :—

काहो मनवो ढ मनुयुगाश्खगतास्ते च मनयुगन्ना च ।
कल्पदेर्युगपादा गच्च गुरुदिवसाच्च भारतात्पूर्वम् ॥

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[1] See Chapter III, above.
[2] *Kânda* VII, 1 to *Kânda* VII, 4, 7.
[3] *Sata. Brah.*, XI, 5, 5, 2.
[4] See Chapter III, above.

"A day of Brahma is equal to fourteen Manus; the number of Yugas in each Manu (period) or Manvantara is seventy-two. From the commencement of the Kalpa to the Thursday[1] of (Yudhishṭhira), the descendant of Bharata, there had elapsed six Manus, twenty-seven Yugas, and three quarters of a Yuga."[2]

Six Manus at the rate of 72 Yugas for each Manu are equivalent to $6 \times 72 = 432$ Yugas. Adding to these the number of $27\frac{3}{4}$ Yugas of the seventh Manvantara, we arrive at the total number of $459\frac{3}{4}$ Yugas. Almost all commentators are unanimous in stating that the seventy-two Yugas which go to form a Manvantara are seventy-two times four Yugas, called Kṛita, Tretā, Dvāpara, and Kali. From the passage of the Bhagavatī Sūtra quoted above, we know that Kaliyuga is the name of the first year, Dvāparayuga of the second, Tretāyuga of the third, and Kṛitayuga of the fourth, and so on in every cycle of four years. Accordingly it is clear that the word 'Yuga' was sometimes used in the sense of a year and sometimes in the sense of a set of four years. In the traditional statement, which Āryabhaṭa has memorised, it seems to have been used in the latter sense. Accordingly the $459\frac{3}{4}$ Yugas mean $459\frac{3}{4}$ cycles of four years each, which is nearly the same as the 460 cycles or intercalary days recorded in the Vedas.

Now the question that arises is how the later Indian astronomers and other writers came to mistake the simple cycle of four years for a huge cycle of 12,000 divine years equivalent to 4,320,000 human years. But before going on to consider this question, it is, however, necessary to know why and when the system of counting the years by

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[1] The commentator adds: "That Thursday on which Yudhishthira, the son of Pāndu of the dynasty of Bharata, went up to heaven."

[2] Verse 3, *Ghatikapada*, *Aryabhatiya* edited by Dr. H. Kern, 1874. According to Āryabhata's own convention, the letter, dha=14; sa=70; kha=2; ga=3; cha=6; chha=7; na=20. Hence skha in the above verse=72; and chhna=27.

cyclic sacrificial days came to a stop. Owing to the over-calculation of about 12 minutes in every tropical year, the error seems to have accumulated to the extent of about fifteen days in the course of about 1,860 years, causing thereby the seasons and solstices to fall back by the same number of days in the year. To this effect there are a few passages in the Śatapatha Brāhmaṇa (XI, 5, 5, 6-7) :—

"They entered upon a sacrificial session of a hundred Atirātras; and, having thereby repelled the Asuras and darkness and all evil, they found the way to the world of heaven. In their first fifty days, the night hymns reached into the day and the day hymns into the night. They spoke, 'Verily, we have got into confusion and know not what to do: come let us resort to Father Prajāpati.' Having come to Father Prajāpati, they spoke (the verses), 'Our night hymns are (chanted) in day time, and those of the day at night: O sage, being learned and wise, teach thou us who are ignorant (how to perform) the sacrifices.' He then recited to them as follows:—'A stronger pursuing, has, as it were, driven a great snake from its own place, the lake; therefore the sacrificial session is not carried through.'"

As already pointed out, it is a custom among the Hindus to regard the days from summer to winter solstice as nights and those from winter to summer solstice as days. Accordingly 'the passing of the night hymns into the days and of the day hymns into the night' seems to refer to the earlier appearance of solstices, with the consequence that those hymns which were usually recited during the interval from the summer to the winter solstice or from the winter to the summer solstice came to be recited for some days during the opposite interval. It is this confusion which is referred to in the above passage. 'The driving of a great snake from its own place' seems to refer to the precession of the summer solstice a few degrees in the constellation of Āślesha, which is called by

the name, 'Snake.' To get rid of this confusion persistent attempts seem to have been made to determine the days of the winter and summer solstices exactly and to reform the calendar. A new system of calendar, based upon a cycle of five sidereal years of 366 days each with the intercalation of two lunar months, as described in the *Vedānga Jyotisha*, seems to have been promulgated. The position of the solstitial colure is thus described in the Jyotisha:—" The sun and the moon turn towards the north at the beginning of Śravishṭha; but the sun turns towards the south in the middle of the constellation, over which the serpents preside; and this (the turning towards the north and towards the south) always (happens) in (the month of) Māgha and Śrāvaṇa."

On this statement, Prof. Archdeacon Pratt has made the following observation :—" If we take the first star *e* in Dolphin and the opposite star *z* in Hydra's head to be the solstitial points, the precessional motion will only be about 40′ more than the above, and the date will be B.C. 1229 or late in the thirteenth century. But *z* is not in middle of Hydra's head; it is about 20′ east of it; and therefore I have no doubt the lunar mansion, and not the constellation, is what the Jyotisha refers to, and the early part of the 12th century is the correct result."[1]

As this astronomical treatise pre-supposes the whole of the Vedic literature, consisting of the Ṛigveda, the Yajurveda, the Sāmaveda, the Atharvaveda, and the Brāhmaṇas, it follows that that literature had already taken a permanent shape prior to the 12th century B.C. In other words, the number of 460 or 465 cycles of four years each, recorded up to the end of the Brāhmaṇas, were an accomplished fact before the cycle of sidereal years of the Vedānga Jyotisha was promulgated. Accordingly, allowing an interval of about 60 or 40 years between the Vedānga Jyotisha of the 12th

[1] See Max Müller's Preface, *Rigveda*, Vol. IV, P. XXVII.

century B.C. and the close of the Brāhmaṇic literature with its 460 or 465 cyclic days, we arrive at 3101 B.C. as the commencement of the Vedic era. Strange to say, it is the same as the Kali era, now of 5,008 years. But it is surprising to observe the scruples felt quite needlessly by almost all Western scholars in accepting the conclusions arrived at by the consideration of the *datum* furnished by the Jyotisha. Prof. Max Muller regards the statement of the Jyotisha as an isolated passage, written about the third century B.C. and carrying no weight whatever with it. "The most important point," says he, "however, is this that the passage which, according to Colebrooke, contains the statement of the solstitial points, such as they were according to him, in the fourteenth century, does not occur in the Mantras, the age of which is certainly anterior to the tenth century B.C., nor in the Brāhmaṇas and the Sūtras, but in a treatise, the Jyotisha, which no scholar would place higher than the third century B.C. It is not my wish to invalidate the conclusions that have been drawn from the recorded observation of the colures. But I feel bound to remark that, unless there was the internal evidence that the Vedic hymns reached back to that remote antiquity, this passage in the Jyotisha would by itself carry no weight whatever. First, it might be perfectly true that such an observation was really made as recorded in the Jyotisha; but where is there the slightest hint that at the same time a single Vedic hymn had been in existence, or, as has been asserted with greater boldness than discretion, that a collection of the Vedic hymns was completed ?"[1]

The passage of the Vedānga Jyotisha about the position of solstitial colure is not so isolated as Prof. Max Muller would have us to believe; nor is it true that it does not occur in the Sūtras; for it not only actually occurs in prose form in Bodhāyana's Śrautasūtra, which is admitted by almost all Oriental scholars to be

[1] Preface to *Rigveda*, Vol. IV, P. XXVIII.

the most ancient among the Sūtras, but also has an important bearing upon cyclic sacrifices. If there were evidence to show that the Jyotisha was really composed in the third century B.C., embodying the traditional observation of the solstitial points made in the 12th century B.C., and if there were no other reliable evidence to determine the date of the Vedas precisely, then the value of the passage as chronological evidence would be almost *nil*; for one would be justified in stating that a later writer reduced to writing what he heard had been observed by his remote ancestors. But where is the evidence to show that the author of the Jyotisha lived in the third, and not in the 12th century B.C., the time of observation itself? As to the internal evidence about the remote antiquity of the Vedas, we have seen enough of it already. When Prof. Max Muller speaks of an assertion, made with greater boldness than discretion, he seems to refer to the hypercritical tendency of Prof. Whitney. No scholar seems to have been more guilty of prepossessed opinions and racial and national bias than Prof. Whitney; for he has gone too far in his criticisms of Oriental matters, and, considering the innumerable difficulties experienced in the modern method of astronomical observations and calculations, has characterised the simple observations of the ancients as a delusive phantom. This is what he says in his "Lunar Zodiac":—"But in estimating the value of such a *datum*, as furnished by the Jyotisha, we have finally to take into account the difficulty of the observation it records. The place of the Equinox is not to be determined by going out and watching the heavens; it is a deduction from observations, by combinations and inferences, which lie quite out of the power of men unskilled in astronomical science. That either the ancient or the modern Hindus have had the capacity to grasp clearly the conditions of the problem involved and to solve it successfully, is, to say the least, not very probable. I

should not expect from them a nearer approximation than within several degrees on the one side or the other. Putting together all these sources of error, we shall see clearly that no definite date is capable of being extracted from the statement of the Jyotisha. It is not easy to make a valuation in figures of elements so indefinite; but it is safe to say that a thousand years would not be too long a period to cover all the uncertainties involved. And when we come to add that the Jyotisha has no definable place in the Sanskṛit literature, or relation to the Vedic ceremonial, that we can only pronounce it later than the Brāhmaṇas and older than the Siddhāntas, we shall see that this famous datum, which seems to promise so much, has caused so much labour and discussion, and is even yet clung to by some scholars as the sheet-anchor of ancient Hindu chronology, is nothing but a delusive phantom."[1]

Prof. Whitney seems to have been thinking of himself and of the countless difficulties, which he must have experienced in making what he calls 'deductions from observations, by combinations, and inferences,' meaning thereby the use of the telescope, the solution of astronomical problems by means of trigonometrical equations and logarithmical tables, the adjustment of instrumental and personal errors, of which no one but a thoroughly trained student of astronomy is capable. It is probable that before he took to the study of the Vedic literature, he met with failure after failure in the attempt to solve astronomical problems. So he arrived at the conclusion that the ancient Hindus, possessing none of the modern astronomical appliances, could not have done what he himself almost failed to do with all the equipment at his command, and that no modern Hindu was capable of doing what a gifted European scholar like himself could not solve without committing errors, perhaps, of several minutes on the one side or the other, and

[1] P. 384, *Linguistic Studies*, by Prof. Whitney.

that the location of solstitial points made by the Hindus could only be correct within about 13° either to the east or west of the observed position, so that what appears to have been the characteristic phenomenon of the twelfth century B.C. as observed by them, might only be correct for the third century B.C. He seems to have forgotten that the determination, nay the very idea, of equinoctial and solstitial days, together with the ceremonial celebrations connected with them, is of the pre-telescopic period. He seems to have been so far mistaken as to have thought that it is impossible to make astronomical investigations without modern appliances. Had the ancient world contained only such men as Prof. Whitney, who are disposed to think that the world could not progress under conditions and circumstances different from those now obtaining, we should not have inherited at all the glorious legacy of modern civilization. But it is a historical fact borne out by trustworthy witnesses that even the modern Hindus, not to speak of the ancient, are, with very humble means, still achieving results surprising enough to Western astronomers. In his "Astronomy Without a Telescope," Prof. E. Walter Maunder says regarding the wonderful achievements of Chandraśekhara Simha, a Hindu astronomer of Orissa:—

"But the work for which the pretentious buildings of the Raja of Amber were designed, has been more efficiently accomplished quite recently by very humble means, and by a recluse in an obscure village. Chandraśekhara Simha Samanta is a near relative of the Raja of Khandapara, one of the tributary chiefs of Orissa. At the early age of ten, having been taught a little astrology by one of his uncles, he became most anxious to measure on his own account the positions of the stars in their nightly movements, and by the time he was fifteen years of age and had learned to calculate the ephemerides of the planets and of the risings and settings of stars, he was deeply disappointed to find how great was the dis-

cordance beween his calculations and what he actually observed. It was no wonder that he found discordances; no two of the current Hindu almanacs agree in their predictions, and one of the most widely circulated of the Bengali almanacs may be as much as 4° out in the longitude of a planet. In this difficulty Chandrasekhara had to work out his problem unaided. He had to make his instrument for himself: to some extent he had to devise them. The one of which he was fondest is a tangent staff consisting of a thin rod of wood twenty-four digits long, at the end of which is fixed another rod at right angles in the form of T. The cross piece is notched and also pierced with holes equal to the tangents of the angles formed at the free extremity of the other rod. For many years he was carefully revising the Siddhāntas in order to bring them into conformity with his observations made at the present period, and he has been able to obtain a most astonishing degree of accuracy in his results. Thus the sidereal period of Mercury is only 0·0007 days different from that adopted by European astronomers; for Venus it is only 0·0028 days. The mean inclination of the orbits of the planets to the ecliptic is correct to about a minute of the arc. The errors of the ephemerides computed from his new constants are reduced to about one-tenth of those found in some of the most widely circulated Hindu almanacs. In his discussion of the moon's motion, he made the discovery—independent and original on his part—of the lunar evection, variation and annual equation, which found no place in the earlier Siddhāntas. In much of his work he had the advantage of comparing his observations with those of Bhāskara, made more than 700 years earlier; not indeed that the latter had recorded his actual observations, but it was possible to ascertain what they must have been from the planetary elements, which he had deduced from them. Nevertheless, to have obtained such important results and so high a degree of accuracy by the naked-eye observa-

tions with entirely self-made instruments, and in the utter absence of modern book-learning, is a striking illustration of what resolution can effect. Chandraśekhara has been compared to Tycho Brahe, and the comparison is in many ways a just one, though the recluse of Orissa lacked many of the advantages possessed by the noble Dane. As to the accuracy of Tycho's work, it will be remembered that Kepler was led to the first of his three great laws by finding that his theory of the circular motion of the planets differed from an observation of Mars by Tycho by eight minutes of arc—but one-fourth of the moon's diameter. Kepler concluding that it was impossible that so good an observer could be in error to that extent, abandoned his hypothesis and tried that of motion in an ellipse. In the recluse of the Orissa village, we seem to see reincarnated, as it were, one of the early fathers of the science, long centuries ere the telescope was dreamt of, as he grappled with the problems which the planetary movements offered to him for solution. More than that, he affords an example of the achievements within the reach of the naked-eye astronomer, and a telling illustration of the precision, which patience and practice can give to the hand and eye. And these are always needed. For be the telescope ever so good and powerful: still that which is by far the most important is the man at the eye-end."[1]

The other remark of Prof. Whitney that the Jyotisha has no definable place in Sanskṛit literature, or relation to Vedic ceremonial, is equally unfounded. As all the authors of Śrautasūtras or Ritualistic Manuals have enjoined the performance of animal sacrifices on the days of winter and summer solstices, the place of the Jyotisha, as a means to determine those days, in Sanskṛit literature, and its relation to Vedic ceremonial, is prominent and well defined. This is what Bodhāyana says in his Śrautasūtra regarding the half-yearly sacrifices :—

[1] P. 165—166, *Astronomy without a Telescope*, Ed. 1903.

अथाप्युदाहरंति षट्सु षट्सु मासेषु आहिताग्निना पशुना यष्टव्यं । उभे ते काष्ठेऽभियजेते । माघे मासे धनिष्ठाभिरुत्तरेणैति भानुमान् अर्धाश्लेषस्य श्रावणस्य दक्षिणेनोपनिवर्तत इत्येते काष्ठे भवतः । तदन्तेनेजानस्य संवत्सरो नातियात् ॥

"Also they declare thus: he who has set up the sacrificial fire should perform an animal sacrifice once in every six months. Two are those cardinal points of time at which sacrifices are to be performed: in the month of Māgha, from the constellation of Dhanishṭha (*a* Delphini), the sun proceeds to the north; from the middle of Āśle-sha (*a* Cancri) in the month of Śrāvaṇa, he returns to the south: these two are the cardinal points. The year of whosoever performs sacrifices attending to these points does not pass beyond its usual limits."[1]

This is not the only passage in which Bodhāyana refers to the necessary custom of observing the occurrence of new or full moon at particular stars. While treating of sacrifices performed in the name of stars, he says:—

सा या वैशाख्याः पौर्णमास्याः पुरस्तादमावास्या भवति सा सकृत्संवत्सरस्यापभरणीभिस्संपद्यते । तस्यामन्वारभेत ॥

"That new moon which occurs before the full moon of the month of Vaiśākha happens once in five years (Samvatsara)[2] at the star of Apabharaṇi (*a* Musca). Then he should begin the sacrifice."[3]

Again, regarding the re-establishment of sacrificial fire, he says:—

सा याऽऽषाढ्याः पौर्णमास्याः पुरस्तादमावास्या भवति सा सकृत्संवत्सरस्य पुनर्वसुभ्यां सम्पद्यते । तस्यामादधीत ॥

[1] P. 80, *Bodhayana Srauta Sutra*, No. 282, MS. Copy, Oriental Library, Mysore.

[2] Samvatsara is a name of the fifth year in the cycle of five years.

[3] P. 44, *Ibid.*

"That new moon which happens before the full moon of the month of Āshāḍha occurs once in five years at the star of Punarvasu (*a* Geminorum). Then he should re-establish the sacrificial fire."

These plain references to animal sacrifice on solstitial days are, I believe, enough to remove the doubt, which Western Oriental scholars have so long entertained as to the ability as well as the necessity of the Hindus to observe the stars and determine the precise positions of the new or full moon at particular stellar divisions of the ecliptic. It is not Bodhāyana alone that refers to the custom of performing animal sacrifices during the winter solstice. Śānkhāyana says in his Śrautasūtra (VI, 1, 18) that an animal sacrifice has to be performed either at the commencement or close of the Udagayana, the sun's northern movement, *i.e.* winter solstice. The same rule is laid down in almost all the Śrautasūtras. The only difference between Bodhāyana and other writers of ritualistic manuals is that, while the former treats of such details as can be known from other works, the latter seem to have omitted them as unnecessary and only refer to them by their technical names. It is, therefore, clear that Bodhāyana lived in the thirteenth century B.C., when the cycle of five years, as described in the Jyotisha, was adopted in place of the Vedic cycle of four years and that by that time the Vedas and the Brāhmaṇas, containing the record of 465 or 460 cyclic sacrifices, had taken a permanent shape. The five years constituting the latter cycle do not seem to have been called Kali, Dvāpara, Tretā, Kṛita and Kali, and so on, in succession, as in the previous cycle; but the cycle itself seems to have been called by the name Kali, inasmuch as the number five is Kali according to the definition quoted above. The Taittirīya Brāhmaṇa says that that which is the assemblage of four is Kṛita and of five is Kali. Thus, it is evident that Kali, associated with other Yugas or years, began in 3101 B.C., and after a conjoint life for

about 1,840 or 1,860 years, drove off its three brothers, Dvāpara, Tretā, and Kṛita, and established itself as the sole sovereign year. Accordingly, we have to distinguish between two Kalis, one beginning in 3101 B.C., and another establishing itself as the sole lord in 1260 or 1240 B.C. It would be in 1240 B.C., if we take the number of the past Vedic cycles to be 465, following the calculation of the Great Litany. But if we take into account the number of Atirātras counted in the Brāhmaṇas, or the number of Yugas as counted in the traditional statement of the past Manvantaras, the date of Kali's conquest would be 1260 B.C. At any rate it is beyond doubt that the true Vedic era, called the 'Gavām Ayana,' or 'Cows' Walk,' is only a different form of the same Kali Era that is still current in India. Regarding the validity of the Kali Era, Prof. Fergusson says in his 'History of Indian and Eastern Architecture':—

"The[1] earliest reasonable statement bearing on the subject which we possess is in the 9th Chapter of Arrian's 'Indica.' It is there stated—quoting from Megasthenes—'that from Bacchus (Ikshvāku) to Sandrocottus (Chandragupta), the Indians reckon one hundred and fifty-three monarchs, who reigned during the space of six thousand and forty-two years.' The first part of the statement is eminently satisfactory, as it seems clear from it that we possess in the Purāṇas the same lists as were submitted to the Greeks in the fourth Century B.C. In the Solar lists, we have in the Tretāyuga sixty-two reigns, from Ikshvāku to Rāma. There is no complete Lunar list in that age. For the Dvāpara age we have three Solar lists: one from Kuśa to Bṛihatsena (Bṛihadbala), thirty-five reigns; another from Dishṭa to Janamejaya, thirty-three reigns; and a third, from the son of Sīradhvaja, the father of Sītā, wife of Rāma, to Mahābasi, (Bahulāśva), thirty-four reigns. In the Kaliyuga we have no complete Solar list, but the Lunar list gives fifty descents from Jarāsandha to the

[1] P. 711, Appendix A, Fergusson's *History of Indian Architecture.*

last Nanda. This gives 145 or 146 reigns, which are rather too few. But the Lunar lists, from the Dvāparayuga, give forty-four from Puru to Yudhishṭhira, and fifty from Yadu to Kṛishṇa, so that the average is as nearly as may be that stated by Megasthenes. The second part of the statement, giving these kings' reigns an average duration of nearly forty years, must of course be rejected, but it is satisfactory to find that, at that early age, the falsification of the chronology had only gone to the extent of duplication, and that the monstrous system of Yugas, with all their attendent absurdities, had not been invented. Though it may not at present be capable of direct proof, I have myself no doubt that the date assigned by the Hindus for the Kali Yuga (3101 B.C.) is a true date, though misapplied. Either it was the date when the Āryans assumed that their ancestors had first crossed the Indus, or the date when they had first settled on the banks of the Sarasvatī or the Ghoghra. It forms no part of any system subsequently invented and seems to be the only one fixed point in a sea of falsification. Assuming it for the present, and deducting Chandragupta's date from it, we have 3101—325 = 2776 years from Ikshvāku to Chandragupta, which, divided by 153, gives the reasonable number of eighteen years for the duration of each king's reign Of course it is not contended that these lists are absolutely to be depended upon—many names may be lost, and many misplaced, from the carelessness of copyists, or from other causes; but, on the whole, when treated in this manner, they afford a reasonable frame-work for the construction of the ancient history of India, and one that accords perfectly with all we at present know about the ancient history of the immigrant Āryans."

No theory other than the one which I have here discussed at length yields so good proof of the validity of the Kali Era, which, even in the absence of direct proof, seemed to Prof. Fergusson to be deserving of consideration. In the light of my theory of the era of the

'Cows' Walk,' it appears to me possible to trace the progress of the composition of the Vedas and the Brāhmaṇas, hymn after hymn and chapter after chapter, and thereby to construct a reliable chronological arrangement of the ancient Indian kings mentioned in those hymns. What, however, for the present concerns us is not the history of ancient kings, but a reliable chronology of the Vedas and the Brāhmaṇas. Now that we have determined the age of the Vedas, what remains to be investigated in this connection is the origin of the huge later Yugas. According to the later system of chronology, the Kṛitayuga amounts to 4,800 divine years or 1,728,000 human years; the Tretāyuga 3,600 divine years or 1,296,000 human years; the Dvāparayuga 2,400 divine years or 864,000 human years; and the Kaliyuga 1,200 divine years or 432,000 human years; so that the original cycle of four ordinary years has in the later system become a monstrous period of 4,320,000 human years. False as is this system, it should not, however, be supposed that it has no historical basis to stand upon. It seems, rather, to have arisen from the inability of later writers to reconcile what appeared to them to be contradictory statements, current at their time with reference to bygone ages. There is no doubt that concurrently with the Vedic era of the 'Cows' Walk' kept by the priests for themselves, there was also a vulgar era, the Kali era, counted *seriatim* by the common people from the same starting point as that of the 'Cows' Walk,' and continued without interruption even during the 12th century and onwards when, for reasons shown above, the sacrificial era of 460 cycles or 459¾ Yugas came to a stop. When after a few centuries, whatever the interval may be, whether eight or ten centuries or more, later writers came to be told of the fragmentary traditional statement of the lapse of 459¾ Yugas, instead of taking them as forming part of the same Kali era, they seem to have regarded those Yugas as distinct periods that had already

passed before the beginning of the Kali era. Āryabhaṭa, for example, says :—

षष्ट्यब्दानां षष्टिर्यदा व्यतीतास्त्रयश्च युगपादाः ।
त्र्यधिका विंशतिरब्दास्तदेह मम जन्मनोऽतीताः ॥

"When three of the four Yugas as well as sixty times sixty years (in the fourth Kali Yuga) have passed away, then, at the time (of my writing), twenty-three years from my birth have ended."

The 'three of the four Yugas' in this passage ought to be no other than the three quarters of the last cycle after the lapse of 459 cycles, as enumerated in another verse quoted above. But Āryabhaṭa gives them another meaning. He says that he had attained his twenty-third birthday, when there had elapsed 3,600 years in the Kali era, begun *after* $459\frac{3}{4}$ Yugas had passed away. This is one grand mistake. Another mistake which he and others committed in this connection consists in the duration which they assigned to each of the four Yugas. The Yugas are, as we have already seen, inseparably connected with Prajāpati, the god of the intercalary day. Accordingly they seem to have laid their finger on the following enigmatical passage of the Śatapatha Brāhmaṇa as containing a clue for the elucidation of the meaning of Yugas.

"Prajāpati bethought himself, 'Truely all existing things are in the three-fold lore: well, then, I will construct for myself a body so as to contain the whole three-fold lore.' He arranged the Ṛik verses into twelve thousand of Bṛihatīs, for of that extent are the verses created by Prajāpati."[1]

In order to understand what the above passage means, it is necessary that we should know clearly the intricate sacrificial calendar kept by the Vedic poets.

[1] *Sata. Brah.*, X, 4, 2, 22—23 ; See also *Chapter II*, above.

The Vedic poets divided their tropical year into three periods, called Sāvana or civil year of 360 days, another period of five evil days, and a third period of an unspeakable quarter-day forming a complete divine day at the close of every fourth tropical year. They kept a record of the first period by composing ten Bṛihatī verses of 36 syllables each per year and called those syllables by the name, Narāśamsasvaras, syllables speakable by men, in contrast with the unutterable quarter-syllable representing the last quarter-day of the tropical year. They disposed of the second period by intercalating 20 days to every fourth civil year and performing their sacrifices on the twenty-first divine day. As pointed out above, there were during the Vedic period two astronomical schools, one (the Utsargins) intercalating the twenty-first day along with the twenty days and beginning their year on the next day, while the other school kept a separate account of the recurring twenty-first day without intercalating it, and thereby caused the seasons to retrograde by one day in every cycle and regain their places at the end of the 360 days of the 'Cow's Walk' corresponding to 1,440 years. Accordingly, the twelve thousand Bṛihatī verses, consisting of 432,000 Narāśamsasvaras, or complete syllables of the Ṛigveda, represented to them not only twelve hundred civil years, but also an equal number of tropical years. Since the first year of every cycle was called by the name Kali or Kaliyuga, the first year of these 1,200 years must necessarily be Kaliyuga. But later writers seem to have taken these 1,200 years as making up one Kaliyuga instead of three hundred Kaliyugas. Again, these 12,000 Bṛihatīs are said in the Śatapatha Brāhmaṇa to make up the body of Prajāpati or Father Year. Accordingly, they seem to have argued that the twelve thousand Bṛihatī verses or twelve hundred years, which formed the body of Prajāpati, could not be ordinary years, but that they must be divine years equal to 432,000

human years as suggested by the Narāśamsa syllables. Again, instead of taking the members 4, 3, 2 and 1 to mean the fourth or the Kṛita year, the third or the Tretā, the second or the Dvāpara, and the first or the Kali in every cycle of four years, they seem to have looked upon those numbers as indicating a proportion between the Yugas and to have alloted to Kṛita, Tretā and Dvāpara four times, three times, and twice as many divine years as in their new Kaliyuga. Thus they seem to have made one cycle of the four Yugas to consist of $4,800 + 3,600 + 2,400 + 1,200 = 12,000$ divine years equivalent to 4,320,000 human years. According to this calculation, the $459\frac{3}{4}$ times four Yugas said to have passed away, would amount to $459\frac{3}{4} \times 12,000 = 5,517,000$ divine years $= 1,986,120,000$ human years.

Or else, misled by the indiscriminate use made in the Brāhmaṇas of the Bṛihatī metre to measure time, later writers might have taken the twelve thousand Bṛihatī verses of the Ṛigveda as representing 12,000 years. For the Vedic poets seem to have employed a Bṛihatī verse of 36 syllables to represent not only thirty-six consecutive days, but also thirty-six intercalary days equivalent to 144 years, in which connection the year (*i.e.* the era of 144 years) is stated to amount to a Bṛihatī. The latter practice is thus referred to in the Śatapatha Brāhmaṇa :—

" 'How many days are there really in the year'? (asked Kauśāmbeya). 'One,' he (Uddālaka Aruṇi) replied. 'A day, indeed,' he said; 'the whole year is just that day after day':—this is the mystic import of the year; and, verily, whosoever thus knows this mystic import of the year grows more (and more) glorious up to (the end of) it; he becomes possessed of a (new) body, he becomes the year, and in the shape of the year he joins the gods."[1]

[1] *Sata. Brah.* XII, 2, 2, 23.

"That year doubtless *amounts to a Bṛihatī*,—there are two Shaḍahas (12) of winning days; the two, Pṛishṭhya and Abhiplava (12); the Go, and Āyus, and the Daśarātra (ten days)—that makes thirty-six; for the Bṛihatī consists of thirty-six syllables; and by means of the Bṛihatī, the gods strove to reach heaven; and in like manner does this one, by means of the Bṛihatī, now strive to reach heaven, and thereby gain heaven; he who knows this secures for himself whatever wish there is in the Bṛihatī."[1]

The one day in a year referred to in the first passage is the intercalary day in the fourth year of every cycle. That is the mystic contrivance for counting the years. The year referred to as amounting to a Bṛihatī in the second passage is that number of the years which is equivalent to thirty-six intercalary days, or 144 tropical years. These thirty-six days are made up of two periods of six days each, called Prishṭhya, another two periods of six days each, called Abhiplava, one day termed 'go,' another day styled as 'Āyus' and a concluding period of ten days. These various names are meant to indicate the particular forms of sacrifices performed on those days. Later Indian writers, however, seem to have misunderstood the expression 'that year doubtless amounts to a Bṛihatī,' and taken it in the literal sense that a single Bṛihatī verse measured a civil year of 360 days. Accordingly, they seem to have taken the twelve thousand Bṛihatī verses of the Ṛigveda as measuring 12,000 years. Also misled by the expression that the 12,000 Bṛihatī verses formed the body of Prajāpati, the god of the year, they seem to have taken those twelve thousand Bṛihatī years to be divine years as contrasted with human years. Accordingly they seem to have multiplied the number 12,000, by 360 and arrived at 4,320,000 human years, which is only ten times as great as the number of syllables contained in 12,000 Bṛihatī verses. The problem of distri-

[1] XII, 2, 3, 1, *Ibid.*

buting these 12,000 divine years into Yugas was not also left unsolved by them. Instead of taking the numbers, 4, 3, 2 and 1 to mean the fourth or the Kṛita year, the third or the Tretā, the second or the Dvāpara, and the first or the Kali in every cycle of four years, they seem to have looked upon those numbers as indicating a proportion between the Yugas and to have alloted $\frac{4}{10} \times 12{,}000 = 4{,}800$ years to Kṛita, $\frac{3}{10} \times 12{,}000 = 3{,}600$ years to Tretā; $\frac{2}{10} \times 12{,}000 = 2{,}400$ years to Dvāpara; and $\frac{1}{10} \times 12{,}000 = 1{,}200$ divine years to Kali. Thus the original seventy-two cycles of four years each in a Manvantara seem to have been changed into a huge total of $72 \times 12{,}000 = 864{,}000$ divine years equivatent to 311,040,000 human years; and six Manus and twenty-seven Yugas together with three-fourths of a Yuga seem to have become a period of 1,986,120,000 human years.

Instead of being confined to India alone, this wrong interpretation of the 432,000 Narāśamsasvaras as signifying so many years seem, to have also contaminated the chronology of the Babylonians. [1]For according to Berosus, who lived in the time of Alexander the Great, the Babylonians are stated to have reckoned past time by long periods. In their language Nerus denoted a period of 600 years, Sossus a period of 60 years, and Sarus a period of 3,600 years. They are further stated to have assigned 432,000 years to the duration of the reigns of some ten ancient kings. Is it possible that the three words, Nerus, Sossus, and Sarus, are the same as the three Sanskṛit words, Nara, Śamsa, and Svara? While the Hindus applied the compound word 'Narāśamasvara' as a name to each of the 432,000 day-signifying syllables of the Ṛigveda, did the Babylonians split the compound into three words and apply them as con-

[1] See p. 401, Lewis's *Astronomy of the Ancients.*

venient names of the three different minor periods of time? The tradition of some ten ancient kings, common to both the nations, as well as the use of the same number, 432,000, in connection with past periods of time contain a suggestion that the three words, Nerus, Sossus, and Sarus have a closer philological connection with the Sanskṛit word Narāśamsavara than that which Prof. Weber and others, in their zeal to father Hindu astronomy upon that of the Greeks, imagined to exist betw en Maya, the name of a Hindu astronomer, and Ptolemy, that of the famous Grecian astronomer. Nay, the very word 'Zodiac,' which all Oriental scholars believe to be Chaldæn in its origin, seems to be rather the Indo-European word 'Jyotis,' 'a star.'

To sum up:—The so-called 'Gavām Ayana,' or 'Cows' Walk,' with the consideration of which our inquiry into the age of the Vedas began, is a sacrificial era of intercalary days in terms of which the Vedic poets counted their years. As Prajāpati is one of the most important names of this intercalary day, the starting point of this era in 3,101 B.C. must necessarily mean the creation of Prajāpati, whom later commentators seem to have mistaken for the world's Creator himself, the son of Vishṇu. Apart from keeping an account of the days reckoned from this starting point of their era, they also counted the intercalary days by means of formulas or of sets of syllables of special Vedic hymns, which they compiled and recited on each of their recurring sacrificial days. Side by side with this sacrificial era, there existed a vulgar era, the Kali era, in which the common people counted their years *seriatim* in contrast with the priestly method of counting the years in terms of Yugas or cycles of four years each. It is this sacrificial era, which the Egyptians and Mexicans borrowed and observed at that time. When the total number of these cycles or cyclic days amounted to 460 or 465, corresponding to 1,840 or 1,860 years, this era together with its cyclic sacrifices came to

an end, leaving the vulgar era alone to continue. In place of the Atirātra, or cyclic sacrifices, half-yearly sacrifices on solstitial days became the order of the new epoch. The epoch-making sacrifices recorded in the Vedas began to be meaninglessly imitated, so much so that the ceremonial details connected with them became a set of jugglers' words and acts. Form, and not the significance, became the most important thing. It is at this stage that the later commentators began to interpret the Vedas and the Brāhmaṇas and, being unable to explain them consistently ruled it out that "*Na chodyam kurvīta*," "No enquiry must be made."[1] But thanks to English education, by means of enquiry made in spite of that rule, we have done our utmost to understand the mystery of the heart of the Vedic poets and their age which the great commentators themselves have failed to elucidate.

[1] See Sayana's Commentary on *Taitt. Sam.* I, 1, 1, p. 14, Asiatic Society's Edition.

APPENDIX A.

The Ayanas.

The practice of counting the years in terms of various kinds of intercalary months or days, such as luni-solar civil-solar, civil-sidereal, and other, either intercalated or not intercalated, seems to have been so prevalent during the Vedic period that a fragmentary record of a number of different kinds of Ayanas, or intercalary periods, is still found preserved both in the Brāhmaṇas and in almost all the Śrautasūtras. In addition to the Gavām Ayana, the Tāṇḍyamahābrāhmaṇa enumerates (XXV, 1) a number of Ayanas, such as (1) the Ayana of the Utsargins, (2) that of the Ādityas, (3) that of the Angirasas, (4) that of Dṛiti and Vātavat, (5) that of the Kuṇḍapāyins, (6) the three years' Ayana of the Tapaśchits, (7) the twelve years' Ayana of Prajāpati, (8) the thirty-six years' Ayana of the Śāktyas, (9) the one hundred years Ayana of the Sādhyas—all of which it declares to be the different forms of the one year's or 360 days' session of the Gavām Ayana. Of these, the Ayana of the Utsargins differs from the Gavām Ayana in this, that while the latter is made to consist of such intercalary days as have been merely counted, but not added to the year so as to keep the seasons in their proper places in the year, the former is the sum total of all the single days, intercalated in every cycle of four years in the course of 1,440 tropical years of the Vedic Era. As the Tapaśchits counted three intercalated years corresponding to the one year of the Gavām Ayana in the course of 1,440 years, the period of intercalation per year in their system

amounts to $\frac{3 \times 360}{1440} = \frac{3}{4}$ days. Accordingly, the year adopted by them must necessarily be the sidereal year of 366 days, which is greater than the solar year by $\frac{3}{4}$ days. Similarly, in the system of Prajāpati, the period of intercalation per year amounts to $\frac{12 \times 360}{1440} = 3$ days; from which it follows that the year adopted in this system consisted of 362 days. Similarly, the period of intercalation per year in the system of the Śāktyas amounts to $\frac{36 \times 360}{1440} =$ 9 days, implying thereby that the year adopted by them consisted of 356 days. Similarly, the period of intercalation per year in the system of the Sādhyas amounts to $\frac{100 \times 360}{1440} = 25$ days, implying thereby that their year consisted of 340 days. The rest of the Ayanas appear to have been of the same form as the Gavām Ayana, differing from it only in ceremonial details.

Of these various Ayanas, the Tāṇḍyamahābrāhmaṇa considers as best the Jyotishṭomāyana, which is the same as the Gavām Ayana, and condemns the rest as unsuited for the correct calculation of the Dawn or the sacrificial intercalary day. It says (XXV, 8, 4—5) :—

" It is stated that those (intercalary) days which intervene between the sun (the intercalary day) and the year in use, have become so many that like paramours, they run away with the Dawn, and the Dawn herself is not seen again. But those who follow the Jyotishṭomāyana become the Jyotis, the Dawn herself."

As a means of keeping up a record of the ever-increasing number of intercalary months or days, which constitute the various Ayanas, the Vedic poets seem to have devised a variety of Śastras or sets of Vedic ver es, of which, a prescribed number of syllables is meant to represent a fixed number of days. The Śastras, such as the Ājyaśastra, the Marutvatīyaśastra, the Vaiśvadeva,

the Naishkaivalya, the Vālakhilya, the Vṛishākapi, the Evayāmmarut, the Kuntāpa, the Aitasapralāpa, the Āśvina or the Bṛihaduktha, seem to bear the same relation to their respective Ayanas as the Bṛihadukthaśastra bears to the Gavām Ayana. That the purpose of these Sastras was to sing, *i.e.* to calculate, the age of Agni, is clear from the following passage of the Aitareya Brāhmaṇa (VI, 5, 33):—

"The priest repeats the Aitasapralāpa. Aitasa was a Muni. He saw the Mantras called the age of Agni (*Agnerāyuḥ*), which should remove all defects from the sacrifice, as some say. He said to his sons, 'O my dear sons, I saw the age of Agni; I will talk about it, but pray, do not scorn me for anything I may speak."

But unfortunately, neither the Brāhmaṇas nor the Śrautasūtras furnish us with precise information as to what Śastra applies to what kind of Ayana and how many syllables in each Śastra represent a day. All these Ayanas are, as pointed out above, personified sometimes as the age of a divine child, Agniprajāpati, and at other times as divine children or angels. I am inclined to believe that the Greek word æôn, a lengthened period, which in the Gnostic philosophy signifies a set of angels (æons) emanating from the self-originated being, has the same origin as the Vedic Ayana. That the idea of angels is based upon the personification of the intercalary day as a divine child, is borne out by the Mandæan system of philosophy. "The Mandæans, known as Sabians, are an oriental sect of great antiquity, interesting to the theologian as almost the only surviving example of a religion compounded of Christian, heathen, and Jewish elements on a type, which is essentially that of ancient Gnosticism. They are now found in the marshy lands of South Babylonia near Basarah." This is what appears in the *Encyclopædia Britannica* regarding their system of philosophy:—

"The ground and origin of all things is Pira, or correctly Pera rabba, 'the great abyss,' associated with whom, and forming a triad with him, are the primal æons Ayar-ziva rabba, 'the great shining æther,' and Mana rabba dekara, 'the great spirit of glory,' usually called simply Mana rabba. The last-named, the most prominent of the three, is the king of light properly so-called, from whom the development of things begins. From him emanates Yardena rabba, 'the Jordan,' which, as the higher world soul, permeates the whole æther, the domain of Ayar. Alongside of Mana rabba frequent mention is made of D'mutha, his 'image,' as a female power. Mana rabba called into being the highest of the æons properly so-called, Hayye Kadmaye, 'Primal Life,' and then withdrew into deepest secrecy, visible indeed to the highest but not to the lowest æons, yet manifesting himself also to the souls of the more pious of the Mandæans after their separation from the body. Primal Life, who is properly speaking the Mandæan god, has the same predicates as the primal spirit, and every prayer, as well as every section of the sacred books, begins by invoking him. . . . . The king of light sits in the far north in might and glory. The Primal Light unfolds Himself by five great branches, *viz.*, 'the highest, purest light, the gentle wind, the harmony of sounds, the voice of all the æons, and the beauty of their forms,' all these being treated as abstractions and personified. Out of the further development and combination of these primary manifestations arise numerous æons (Uthre, 'splendours'), of which the number is often stated to be *three hundred and sixty*. They are divided into a number of classes (kings, hypostases, forms, &c); the proper names by which they are invoked are many, and for the most part obscure, borrowed doubtless, to some extent, from the Parsee Angelology. . . . . . . His (the Highest Life's) usual epithet is 'the Ancient'; and he is also called 'the deeply hidden and guarded.' . . . . . By Ur,

Ruha, while P'tahil was engaged in his work of creation, became mother of three sets of seven, twelve, and five sons, respectively; all were translated by P'tahil to the heavenly firmament the first group forming the planets and the next the signs of the Zodiac, while the third is as yet undetermined. . . . .
Besides Sundays there are six great feasts: (1) that of the new year (Nauruz rabba), on the first day of the first month of winter; (2) Dehwa h'nina, the anniversary of the happy return of Hibil Ziva from the kingdom of darkness into that of light, lasting five days, beginning with the eighteenth of the first month of spring; (3) the Marvana, in commemoration of the drowned Egyptians, on the first day of the second month of spring; (4) the great five days' baptismal festival (Pantsha), the chief feast, kept on the five intercalary days at the end of the second month of summer,—during its continuance every Mandæan, male and female, must dress in white and bathe thrice daily; (5) Dehwa d' daimana, in honour of one of the three hundred and sixty Uthras, on the first day of the second month of Autumn; (6) Kanshe Zahla, the preparation of the feast, held on the last day of the year. . . . . The year is solar, and has twelve months of thirty days each, with five intercalary days between the eighth and ninth months."[1]

I believe that the 'Triad' of the Mandæan philosophy is no other than the three quarter days of three consecutive tropical years, which, like the Vedic Cows 'hidden in the darkness of a cave,' bring forth a child or 'king of light' in the fourth year. The 'five great branches' appear to be the five days, which are the difference between a civil and a solar year. The 360 æons appear to be no other than the 360 divine cows or children that constitute the 360 days' session of the Gavām Ayana.

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[1] Pp. 468—470, Vol. XV, *Encyclopædia Britannica.*

APPENDIX B.

The Dates of a Few Ancient Kings.

As pointed out above, the Atirātra sacrifices enumerated in the 7th Kāṇḍa of the Kṛishṇa Yajurveda are sacrifices performed on the intercalary days subsequent to the 360 days of the 'Cows' Walk.'

Now, both Atri and Jamadagni are stated in the Kṛishṇa Yajurveda, (VII, 1, 8-9) to have performed the fourth Atirātra sacrifice. According to Aśvalāyana Śr. S. X, 2, 25, Viśvāmitra is also believed to have performed the same sacrifice. Accordingly, the date of Jamadagni, the father of Paraśurāma, who was the contemporary of of Rāma, the hero of the Rāmāyaṇa, and sixty-fifth in the list of Solar Kings from Manu, is $360 \times 4 + 4 \times 4 =$ 1,456 Kali Era, or $3{,}101 - 1{,}456 = 1645$ B.C.

In Āśvalāyana Śr. S. X, 3, 14, Janaka is stated to have performed the seventh Atirātra sacrifice. Hence his date is $367 \times 4 = 1{,}468$ Kali Era, or $3{,}101 - 1{,}468 =$ 1633 B.C. This Janaka can be no other than the one whose daughter, Sīta, was married to Rāma.

Both in the Tāṇḍyamahābrāhmaṇa, XXV, 10, 17-18 and in the Vishṇu Purāṇa, IV, 4, Nami or Nimi, the twenty-third ancestor from Sīradhvaja Janaka, the father of Sītā, is stated to have performed the one thousandth year's sacrifice. Hence his date is 1,000 Kali era or 2101 B.C. Giving about 20 years on an average to each of the twenty-three kings from Nimi to Sīradhvaja, we arrive at 1,460 Kali era as the date of the latter.

Bharata, the son of Dushyanta, is stated in Āś. Śr. Ś. X, 5, 8, to have performed the twelfth Atirātra. This

gives 372 × 4 = 1488 Kali Era or 1613 B.C., as the date of Bharata. According to the list of kings given in the Vishṇupurāṇa, Yudhishṭhira, the hero of the Mahābhārata, and contemporary of Kṛishṇa is the 25th descendant from Bharata, and died, as pointed out above, in 1260 B.C. Accordingly, the interval between Bharata and Yudhishṭhira is 247 years, which, if the list is correct, gives about 10 years, on an average to each of the 25 reigns. Parīkshit is the grandson of Yudhishṭhira. The interval between him and Nanda is according to the Matsyapurāṇa one thousand years less by one hundred and fifty.[1] Nanda lived in the 4th century B.C.

[1] P. 230, Book IV, 25. *Vishnupurana*, Wilson's translation.